THE GAS JOURNAL

MAY 25, 1932

Vol. 198 84th Year No. 3601

A Glance at the Contents—

Colombo Gas Company, Ltd.

A report of the Annual Meeting of the Colombo Gas and Water Company appears on p. 450.

World's Largest Klonne Holder.

Particulars are given of the new 6 million c.ft. Stacey-Klönne holder just completed for the Syracuse Lighting Company, Syracuse, N.Y. [p. 440.]

Gas for Steam Raising.

Modern developments in the application of gas to steam raising were demonstrated at an exhibition held in Manchester this month. [p. 438.]

Using Coke Breeze on the Works.

An abstract translation is published of an account on this subject by A. Kolar which appeared in "Das Gas- und Wasserfach" for April 2 last. [p. 439.]

Gasholder and Tank Riveted Joint.

Mr. S. M. Milbourne advances a graphical method of analysis which facilitates the design of most forms of riveted joints and enables the efficiency to be readily estimated without tedious calculation. [p. 436.]

City and Guilds Examination Questions.

We publish to-day the questions set in the City and Guilds of London Institute, 1932, Examinations in Gas-Works Practice, Gas Supply Practice, and Gas Fitting. [p. 441.]

Refractory Materials.

An abstract is given of a paper on the behaviour of refractory materials in continuous vertical retorts by Mr. A. T. Green. The contribution was presented at the spring meeting of the Refractory Materials Section of the Ceramic Society. [p. 446.]

Accountant and Cashier Wanted.

A gas undertaking has a vacancy for an accountant and cashier. [p. 455.]

Review.

Mr. H. M. Spiers reviews "The Analysis of Fuel, Gas, Water, and Lubricants," by Prof. S. W. Parr. [p. 443.]

Cumberland and Westmorland Association.

Officers for the coming session were elected at a meeting of the Cumberland and Westmorland Gas Managers' Association held on Friday last. [p. 435.]

Outdoor Superintendent Required.

As will be seen from our advertisement columns, the County Borough of Birkenhead are inviting applications for this position—the commencing salary being £450. [p. 456.]

Montevideo Gas and Dry Dock Company, Ltd.

Until this Company are free to transfer their cash in Montevideo to London, they will not be able to pay a dividend, though their profits would allow of one of 3 p.ct. [p. 448.]

Cape Town and District Gas Light and Coke Co., Ltd.

A dividend of 3 p.ct. (making 6 p.ct. for the year) was declared at the Annual Meeting of this Company, held in London on May 18. The revenue account shows a decreased income of practically 6 p.ct. [p. 448.]

Public Lighting.

We publish an extract from a paper on "Public Lighting as a Measure of Safety," presented by Mr. H. Davies, Engineer and Manager to the Chesterfield Gas Department, at the National Safety Congress. The paper was compiled by various members of the Association of Public Lighting Engineers. [p. 444.]

Forthcoming Engagements

May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—Meeting of Council in the morning, 56, Victoria Street, S.W. 1.
May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—General Meeting in London.
May 26.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Meeting at Swansea.
June 6.—INSTITUTION OF GAS ENGINEERS.—Meetings of Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee, 3 p.m.; Council, 4 p.m.; 28, Grosvenor Gardens, S.W. 1.
June 7-9.—INSTITUTION OF GAS ENGINEERS.—General Meeting in London.
June 14.—INSTITUTION OF GAS ENGINEERS.—Meeting of Joint Lighting Committee, 2.15 p.m., 28, Grosvenor Gardens, S.W. 1.
June 14.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board. 28, Grosvenor Gardens. S.W. 1.
June 18.—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION (AUXILIARY SECTION).—Meeting at the works of the Washington Chemical Company, Ltd.
June 23.—B.C.G.A.—Meeting of General Committee, 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.
June 24.—B.C.G.A.—South-Western District Conference, Dartmouth.
June 24.—WAVERLEY ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Edinburgh.
June 29.—B.C.G.A.—Lancashire District Conference, Stockport.
Sept. 1.—ASSOCIATION OF STATUTORY METER INSPECTORS.—Annual Meeting in Edinburgh.
Sept. 8.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Ayr.

1932 "JOURNAL" Directory.

Page 54. PORT TALBOT. E. M. Edwards (from Sittingbourne District, see p. 62) appointed Engineer and Manager vice A. J. Bond, deceased.

EDITORIAL NOTES

The Coal Situation

IT is common knowledge that the Act of Parliament governing miners' hours is due to expire in July next, and that Part I. of the 1930 Act, which deals with Marketing Schemes, Minimum Prices, and Quotas, must come under the review of Parliament at the end of this year. The Act of 1926 increased the working hours of miners from seven to eight for five years, but when the 1930 Act was passed the hours were reduced from eight to seven and a half until July 8, 1931—*i.e.*, until the date when the hours would automatically be reduced to seven under the 1926 Act. This arrangement was made as the Industry was quite unable, at that time, to bear the cost of a seven-hour day, and it was hoped by the late Government that international agreement might be possible in the interval for the installation of a seven or seven and a quarter hour day. This latter, however, was not achieved, and a short Act was therefore passed last summer for the purpose of continuing the seven and a half hour day for another year, coupling with it a guarantee of the same wages as the miners were then receiving. When the latter Act expires, therefore, in July next a seven-hour day will again automatically come into force unless a new Act is passed dealing with the matter.

It is understood that the miners are under no illusion as to the impossibility of a return to the seven-hour day in the present state of the Industry, and are willing to continue to work seven and a half hours for a time if some security can be given to them as to their wages. We believe that the Hours-Wages Act last year was the first time that miners' wages have ever been enforced by Parliament, and although colliery owners are said to be willing to continue the seven and a half hour day, they strongly object to its being coupled again with a guarantee about wages. This, then, is the position at the present time. There have been meetings between the representatives of the owners and miners, and both sides are in touch with Ministers and their Departmental Officials for the purpose of arriving at an agreed settlement, but so far nothing has emerged. The Government is said to be anxious to bring in now legislation which will leave the Industry free for several years, and it is to be hoped they will be able to do this, although we believe that the continuation of Part I. of the 1930 Act in its present form will be thoroughly bad for the Industries of this country, particularly for the Gas Industry, and in the end be of poor service to the Coal Industry itself.

Much can be said for equating supplies with demand, and for the elimination of cut-throat competition which involves the collieries in loss and denies reasonable wages to the miners, but it is quite another matter to do these things by Act of Parliament and give bureaucratic powers to committees of coalowners with the authority of the Government behind them. The industries of this country are paying more for their coal as a result of the 1930 Act, but this is largely due, not to the reduction in miners' working hours, but to the inherent defects of Part I. of that Act. It is unnecessary to emphasize that as a prime raw material of industry coal should be available at as cheap a price as is possible, and as export coal is one of the principal means whereby we can adjust our trade balance it follows also that coal should be available for export at a price which will enable it to compete in the world markets, but neither of these things is achieved under the 1930 Act.

Despite the higher cost of coal for home consumption compared with the price of the same grades sold for export the latter trade has declined, and those concerned with it are most unhappy about its prospects. The restrictions imposed by foreign countries on the importation of our coal and the low cost of production and subsidies granted to Polish and other coals are not ignored in consideration of this state of things, but those conversant with the facts know that the operation of Part I. of the 1930 Act has been most harmful to the export business and are most active in condemning it. It is reported, however, that the majority of the coal producing districts are in favour of its continuation, but it is certain that the colliery owners would rise in a body and refuse to have anything to do with it were it not that it empowers them to charge any price they like for coal consumed in this country and to inflict penalties on any colliery which does not sell its coal in accordance with the secret minimum price schedules. Colliery owners and miners are therefore at present urging the Government to renew this section of the Act, and it is freely stated that both sides are pressing for the imposition of a levy on the home trade for the purpose of making a general subsidy to export. It will be remembered that a similar proposal was removed from the original 1930 Bill, and unless active opposition is made on behalf of the home consumers there is a great danger of another handicap being placed on the industries of this country.

What then is the remedy for this ever-recurring and dismal tale of trouble in the Coal Industry? Experienced colliery owners are almost unanimous in their opinion that legislative interference is at the root of their troubles, and certainly no industry in the world has ever had to submit to so much. Since the war this has been intensified, but peace and prosperity seem to recede as interference grows. We are of the opinion that when certain human rights of the individuals engaged in any industry have been protected the less legislative interference there is the better; that the establishment of minimum prices, quotas, and restrictions under the authority of an Act of Parliament are inimical to the coal and other industries. Under the operation of Part I. of the 1930 Act it is notorious that some of the most efficient and modern pits are condemned to stand idle ten or more days a month. If economic forces, individual endeavour, and enterprise were allowed full play so that the production of a staple raw material like coal was concentrated where those forces had reasonable prospects of operating at a profit, we are confident that the question of quotas, minimum prices, and selling agencies would settle itself, and that the Coal Industry would soon cease to carry so many " passengers " at the expense of the coal consumers of this country. If it be argued that such a policy would result in the abandonment of a considerable quantity of coal, our reply is that it is unfair to ask the industries and consumers of coal in this country to subsidize collieries which, whether from age, condition, or lack of efficient control and plant, would otherwise have to shut down.

The present position is profoundly unsatisfactory, both to the consumers of coal in this country and to the Coal Industry itself, nor does it appear to have any prospect of being otherwise while political interference is persisted in by successive Governments. Unless the Coal Industry is left free to manage its own affairs and compelled by the stern facts of world industry to order them on sound economic lines, it appears inevitable that the coalowners will ask to be invested with still more powers—a general levy for subsidized exports; the elimination of all competition by removing that between the districts; central bureaus for the sale of coal, &c.; in fact, most of the evils of nationalization without the disinterested control. Eventually the country may be driven to the desperate expedient of nationalizing the mines in the vain hope of ridding its industries of the shackles it has allowed to be placed upon them.

Powers of Investment

THE interim report of the Gas Legislation Committee (under the Chairmanship of Mr. F. J. Wrottesley, K.C.) expressed the opinion that gas undertakers should have power to purchase, acquire, or hold any shares, stock, mortgages, or debenture stock of any company carrying on any such operations as they themselves are authorized to carry on. They also thought that certain gas undertakings might be permitted to invest in companies engaged solely in developing inventions or processes in relation to and likely to improve the manufacture or supply of gas or the utilization of residual products obtainable in or resulting from such manufacture; and they suggested that power to invest in this particular way might be confined to undertakings with an output above 250 million c.ft. of gas per annum. The limit of expenditure on these matters the Committee thought might be in the case of companies one-tenth of the authorized share and loan capital, and for local authorities one-tenth of the capital expenditure for the time being on the undertaking.

Subsequently a Joint Committee of both Houses of Parliament sat to consider these interim recommendations of the Gas Legislation Committee, and generally the extent to which gas undertakers should be authorized to invest funds in other undertakings. Applications were made to the Committee on behalf of the South Suburban Gas Company, the South Metropolitan Gas Company, and the Commercial Gas Company to be heard by Counsel and to tender evidence. A similar application was made by the National Gas Council. The Committee acceded to both these applications, and they further had the advantage of hearing the views of the Board of Trade, which were put before them by Counsel. The views of local authorities were not presented to the Committee, except so far as they may be regarded as being represented by the National Gas Council. The proceedings of the Committee were reported at length on pp. 317-323 of the "JOURNAL" dated May 11, and that report makes sufficiently clear the attitude on the matter of the Companies referred to and of the National Gas Council.

The Joint Committee, in their report, say they have come to the conclusion that the recommendations of the Gas Legislation Committee (termed the "Wrottesley Committee") are in substance sound, and that the powers proposed should, pending general legislation, be conferred as a matter of course in Private Bills on any undertaking which asks for them and fulfils the necessary conditions. They recommend, however, that the powers of investment should be limited to investments in companies registered and operating in Great Britain and Northern Ireland, and that, in addition to "purchasing, acquiring, and holding" express power should be given to subscribe for shares in companies about to be formed, and to sell or otherwise dispose of shares which have been acquired.

The clause (called the "Wrottesley Clause") to which these additions are recommended is as follows:

The Wrottesley Clause.

It shall be lawful—

(*a*) for any undertaker not being a local authority (subject in the case of an undertaking being a company registered under the Companies Act, 1929, to its being so authorized by its Memorandum of Association) to apply money raised by way of share capital or borrowed on mortgage of the undertaking to an extent not exceeding one-twentieth or, with the approval of the Board of Trade, to an extent not exceeding one-tenth of the aggregate amount which the undertaking is for the time being authorized to raise as share capital and to borrow on mortgage for purposes of the undertaking; and

(*b*) for the Minister of Health, with the concurrence of the Board of Trade, to sanction (subject to such terms and conditions as to repayment or otherwise as he may think fit to impose) the borrowing of money by an undertaker being a local authority to an extent not exceeding one-tenth of the capital expenditure for the time being on the gas undertaking of the undertaker;

for purposes of purchasing, acquiring, or holding any shares, stock, mortgages, or debenture stock of any company—

(i) carrying on any such operations as they themselves are authorized to carry on; or

(ii) engaged solely in developing inventions or processes in relation to and likely to improve the manufacture or supply of gas or the utilization of residual products obtainable in or resulting from such manufacture.

Provided that the powers to invest money for purposes specified in sub-paragraph (ii) shall apply only in the case of an undertaker whose sale of gas in the preceding year has exceeded a quantity equivalent to 250 million c.ft.

The Joint Committee, having heard the evidence which was reported in the "JOURNAL," express agreement with the Wrottesley Committee that there is "considerable objection to any proposal to enable statutory gas undertakers in general to acquire financial interests in commercial undertakings which are not calculated to be of direct benefit to the gas industry, and which may result in losses which must ultimately become a burden on gas consumers." A proposed clause was submitted to the Committee, but they say: "If powers in excess of those in the Wrottesley Clause are to be conferred on any gas company, the Committee have been unable to arrive at any method of distinguishing the class of company on which the powers should be conferred. The fact that a company has a very large capital or a very large output of gas does not appear to afford any reason for distinguishing it from other substantial companies as regards powers of investment, and indeed in some ways to confer such powers on the very large companies would be particularly objectionable, as their power of competition with outside traders would be proportionately greater and, in the case of companies engaged in the manufacture of gas appliances, might force them out of business altogether." Therefore the Committee have come to the conclusion that the case put before them is not strong enough to justify any extension of the Wrottesley Clause, and they accordingly recommend that clause for general adoption in Private Bill legislation, though they do not dispute the right of any company to petition Parliament for extended powers.

Saving on Refractories

ONE of the features of the Spring Meeting of the Refractory Materials Section of the Ceramic Society this month was a paper on the behaviour of refractory materials in continuous vertical retorts, by Mr. A. T. Green, who is well known to our readers for his work in connection with the Refractory Materials Joint Sub-Committee of the Institution of Gas Engineers. In the "JOURNAL" to-day we publish an abstract of the contribution, in the hope that it may help to broaden the usefulness of the author's work and also focus attention for a time on a subject which, though so important to the economy of a gas-works, is often allowed to remain in the background because developments in other phases of gas manufacture may be either more spectacular or easier to understand.

At least two considerations to which attention is called by the author are worthy of special emphasis. One is the importance of care in the initial heating up of retort settings, in choosing the right cements, and in the examination of retorts after operation, and of the influence of slags. The other is the selection of the refractory materials of construction. The paper indicates the zonal nature of certain of the troubles. It is feasible, therefore, to suppose that different types of refractories are required for the different zones. The author suggests the development of a special type to resist flaking action better than a silica brick, and believes that the introduction of this new type over some 4 ft. of the retort length might cut down flaking to a minimum and reduce the necessity for hot patching of the top zones. At the moment it appears that the possible refractories which could be used for high-temperature carbonization and would resist flaking would be comparatively costly. If, however, such products increased the certainty of continued operation by 500 days, the author believes that they would amply repay the extra cost. Similarly, the zonal nature of vertical

retort working suggests that the constitution of a cement must vary with the zone of the retort; and it is along these lines that progress with gas-works refractories is likely to be made.

Banks and Public Utilities

THERE appears in the current issue of "Modern Transport" an interesting commentary on the attitude of the banks in this era of extremely low money rates. While the present Bank Rate of 2½ p.ct. is admittedly abnormal, it is thought in some City circles that it may yet be further reduced, prior to the flotation of the Treasury's gigantic conversion scheme, to a lower figure than it has reached since 1897. It is therefore pertinent to inquire, with our contemporary, whether the time is not opportune for some attempt to induce the banks to facilitate temporary financial accommodation in the case of the larger commercial undertakings and public utilities generally, by withdrawing the minimum rate of 5 p.ct. for bank overdrafts. It is pointed out that since the reduction of the Bank rate in recent months loans have been arranged, in cases "where the borrower has a good name and can offer reasonable security for repayment," at rates of interest below this minimum, but we feel that until some official pronouncement on the subject is made there will be a tendency for the smaller undertakings at any rate to be too much dependent on the attitude of the head offices of the various banks in the consideration of an application for accommodation at a rate lower than the official minimum.

It is no doubt true that many gas and other public utility undertakings are in a position to negotiate for more favourable terms in respect of overdrafts, but, having regard to the centralized administration of banking in these days, when the local aspect has almost disappeared, we have cause to think that a good case could be made out for the inherent stability of statutory, and even non-statutory, undertakings in this country to be brought to the notice of the banks in order to obtain a definite reduction in this minimum rate. The contention that a rate of 5 p.ct. offers a means by which bankers may deter the granting of loans for purposes of speculation, would not be affected, as Parliament has taken ample care to provide that public utilities shall not indulge in speculative ventures. Any such general reduction would not, of course, prejudice those undertakings which have secured equal or better terms, and would still leave an opening for further negotiation in special circumstances.

Unusual Distribution

THE results of an investigation undertaken during the past six years, both in the laboratory and on the district, into the use of copper and copper alloys for gas mains and services have recently been published, and they provide much useful and interesting information on an unusual method of gas distribution. An account of the investigation, by Messrs. A. F. Bridge and F. A. Hough, of the Southern Counties Gas Company of California, formed the subject of a paper at the Distribution Conference of the American Gas Association last month, and an abstract of it appeared in the "Gas Age-Record" for April 23. Many types of soil are encountered in the area of the Southern Counties Gas Company, some of which have an extremely corrosive action on iron and steel, and it was found that even seemingly well protected steel pipes had a very short life—not that the material employed as a protective agent was in itself inefficient, but that the coating was liable to damage, with consequent mischief to the main. Hence the trial of copper and copper alloys; and the evidence gained indicates that copper (or with certain soils a suitable alloy) corrodes much less rapidly when exposed to corrosive soils than does steel. Taking into account the difference in wall thickness between the equivalent steel and copper pipes, the conclusion is drawn that the time required to perforate a copper main would be more than twelve times that required to perforate a steel main.

In general it would appear from the research that the lower rate of corrosion of copper would in certain circumstances well justify its use for gas services and for 2-in. and 3-in. mains, provided internal corrosion is not a limiting factor, though it would not be suitable in areas where stray-current electrolysis is severe. The authors mention that copper is susceptible to attack by sulphuretted hydrogen in presence of water, and that after a certain concentration of sulphuretted hydrogen in the gas internal corrosion takes place at a rate exceeding external soil corrosion; but in this country gas is supplied wholly free from sulphuretted hydrogen and more and more gas is being dried before distribution. Without taking into consideration the costs involved in leakage mitigation and maintenance work which inevitably accompany the use of a pipe material susceptible to soil corrosion, the authors arrive at the following conclusion: "When chemical and physical conditions are such that copper pipe can be used it is economically sound at existing prices to use it for 2-in. and 3-in. mains in soils where the life of wrapped steel mains is less than 19 years, and for services in locations where wrapped steel services have an expectancy less than 22 years." In view of this, and of other advantages peculiar to copper which are set out in the contribution under review, experimental work in this country on the internal corrosion of copper pipes employed for the distribution of gas might yield promising results.

Correspondence

"400 B.Th.U.'s?"

SIR,—I have read with interest Mr. L. H. Sensicle's letter in your issue for May 18, relative to the above.

Mr. Sensicle considers the price of 17s. 6d. per ton, which I have allowed for coke, to be too low. He states: "While this position exists at South Bank, it is surely only representative of a few undertakings unfavourably situated for marketing residuals. As a manufactured smokeless fuel, coke should command, in normal circumstances, a higher price than raw coal, or how could there be a coking industry?"

In the first place, may I make it quite clear that the price of 17s. 6d. is a net figure after allowing for the usual expenses, including capital charges and repairs on coke-handling and screening plant, and also depreciation by putting coke to stock during the summer months, as, naturally, if no coke is made, these expenses do not occur.

Secondly, I would respectfully suggest that Mr. Sensicle does not appear to be *au fait* with "net" coke prices in the North-East of England.

A considerable amount of coke has been shipped from this district at prices ranging from 12s. to 15s. f.o.b. and even less, and it does not need a large percentage of coke to be sold at these figures to bring the average *net* price below the 17s. 6d.

Upon talking this matter over this morning with the Engineer of a large works in the North-East, I was informed that he would cheerfully make a contract for the whole of his output at a price of 17s. 6d. per ton net.

Mr. Sensicle asks, "How there can be a coking industry if the price of coal is higher than the price of coke?"

As a matter of fact, coke ovens are often owned by colliery companies, or *vice versa*, and the price charged for coal to the coke ovens is more often than not much lower than the cost of the same coal to gas undertakings.

Yours, &c.,
R. H. DUXBURY,
Engineer, Manager, and Secretary.

South Bank and Normanby Gas Light and Coke Company, Ltd.,
May 20, 1932.

PERSONAL

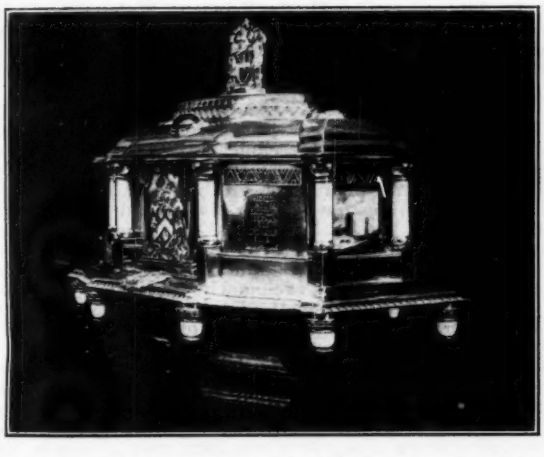
ALDERMAN J. H. LLOYD HONOURED.

On May 6 the City Council of Birmingham admitted to the Honorary Freedom of the City Alderman J. H. Lloyd, J.P., "father of the Council" and for many years Chairman of the Birmingham Gas Committee. He has been a member of the Council for forty years.

We reproduce a photograph of the casket in silver containing the scroll, which is an illuminated engrossment of the following:

Resolved—

That this Council, gratefully recognizing the life-long services rendered to his native City by Alderman John Henry Lloyd, M.A., J.P., as Lord Mayor and a Magistrate of the City of Birmingham, as a Member of the City Council, of which he is now the senior member, and as Chairman of several important Committees of the Council; and recalling further his gift to the citizens of Farm, Sparkbrook, and his close association with the University of Birmingham, of which he is the Deputy Pro-Chancellor, and his unselfish labours in connection with the establishment and administration of the Social Institutes Committee and many other local Charities, as a token of their sincere appreciation of the high sense of duty and public spirit which have characterized his citizenship do hereby in pursuance of the Honorary Freedom of Boroughs Act, 1885, confer upon him the Honorary Freedom of this City of Birmingham, and he is hereby admitted to be an Honorary Freeman of the City of Birmingham accordingly.



A feature of the casket is the decorative use which is made of the colours, silver (in its natural colour) and blue enamel as in the recipient's Arms. The Arms are placed in the centre of the casket and blue enamel is used as a background to an ornamental border surrounding the upper part of the body. The City Arms surmount the cover; they are carried out with modelled supporters and are enamelled in full heraldic colours. Other striking features are the use of ivory for the pillars and the feet, and the introduction of four large crystal stones on the cover. On the reverse of the casket is a view of the main entrance of the Council House executed in repousse. Alderman Lloyd's monogram is placed beneath his Arms and outstanding events in his distinguished civic career are recorded in four small oblong spaces. Enamelled views appear at each end of the casket, one representing the Birmingham Water Supply in Wales, and the other the City Gas Supply, with both of which undertakings the recipient has been very actively connected for many years.

Alderman Lloyd's fellow recipients of the honour were Mr. Neville Chamberlain, Chancellor of the Exchequer, and Mr. Barrow Cadbury.

PRESENTATION TO MR. TIPLADY.

Mr. T. W. Tiplady, who recently retired from the position of Manager of the Bakewell (Derbyshire) Gas Department after 30 years' service, has been presented by the Urban Council officials and employees with a handsome mahogany clock with Westminster chimes. The presentation was made by Mr. P. Wood (Chairman of the Bakewell Gas Committee), who said that Mr. Tiplady had rendered faithful service to the Council, and those who had worked with him thoroughly appreciated his worth. Mr. Tiplady was a man whom everybody liked, and they would greatly miss him.

Mr. Tiplady, in returning thanks, said the gift was quite unexpected, and in the future as in the past his best services would always be at the disposal of the town. The clock bore the inscription:

"Presented to T. W. Tiplady by the officials and workmen of the Bakewell U.D.C. on his retirement, May, 1932."

The numerous friends of Mr. S. E. WHITEHEAD, B.Sc. (Eng.), A.M.I.Mech.E., will congratulate him on his appointment as Engineer and General Manager of the Southampton Gas Light and Coke Company. Mr. Whitehead went to Southampton from Portsmouth in January, 1930, when he was appointed Engineer to the Gas Company. Prior to this he was for ten years Chief Assistant to the Engineer of the Portsmouth Gas Company. Mr. Whitehead received his training in the City of Birmingham Gas Department, afterwards spending two years as Draughtsman, Chemist, and Assistant at Southport, and four years in the Gas Section, Department of Explosives Supply.

Dr. R. LESSING has moved his laboratory, and his Consulting Practice is now being carried on at 50, Queen Anne's Gate, Westminster, S.W. 1.

We learn from the South Metropolitan Gas Company Co-Partnership Journal for May that an interesting event took place on Feb. 24, 1932, the date being the first Board day after the 50th anniversary of Mr. FRANK BUSH's entry into the Company. Mr. Bush was appointed Secretary in 1882, retiring from that position to take a seat on the Board of Directors in 1908. On behalf of his colleagues on the Board, Mr. Bush was presented with a souvenir of the occasion, consisting of a gold pen, which bore the following inscription: "*Presented by his Co-directors to Frank Bush, Esq., on his attaining fifty years' service with the South Metropolitan Gas Company.*"

Mr. W. I. WOOD, who has retired from the service of Sunderland Gas Company after 53 years' service, has been presented by the officials with a microscope. Mr. Wood occupied the position of Chief Clerk and Cashier for many years. Mr. J. H. Curry, the Secretary, in handing over the gift, said that since Mr. Wood first joined the staff the Company's manufacture of gas had increased from 336 million c.ft. in 1879 to 1430 million c.ft. in 1931. Mr. Wood said he had always been happy in the service of the Company.

Mr. GEORGE MACBETH MENZIES (52), of Edinburgh, Chairman of the Bathgate Gas Company, left personal estate in Great Britain valued at £63,629.

It was stated in the "JOURNAL" last week that Mr. J. M. MCLUSKY, who has been appointed Assistant Engineer and Manager to the Wakefield Gas Company, is the son of Mr. W. B. McLusky, of Halifax. In fact, he is a son of Mr. S. G. McLusky, Superintendent of the Keighley Gas-Works.

OBITUARY

The death has taken place of Mr. JOHN WHITTINGHAM WYCHERLEY at the age of 72 years. For twenty years he occupied the position as Secretary of the Malpas Gas Company, which was founded by his father. He relinquished that position about two years ago.

Members of the Gas Industry in many parts of the country, and especially those who have been accustomed to attend meetings of the British Commercial Gas Association, will join in condolences with Alderman J. H. WADDINGTON, Chairman of the Halifax Corporation Gas Committee, and former Mayor of that town, on the death of his father, Mr. Joseph Waddington, at Heysham on May 17, at the age of 97 years.

The death took place last week at Weymouth, where he was on holiday, of Mr. CHARLES WILLIAM WELFORD, aged 47, Accountant and Commercial Manager of the Cheltenham Gas Company. He was in the Company's service for nine years, and took an active part in the recent amalgamations with the Tewkesbury and Winchcombe Gas Companies. He was an active member of the local Chamber of Commerce.

THE NEWS OF THE WEEK

The Todmorden Corporation Gas Committee have reduced their price for gas by 1d. per therm.

By Order of the Debenture Holders, the Starcross and Kenton Gas Light and Coke Company's premises, plant, and works are being offered for sale by tender.

We Have Received from the Cromer Gas Company, West Street, Cromer, a copy of the Official Guide to this popular seaside resort.

Whessoe Foundry and Engineering Company, Ltd.—The Directors recommend a dividend of 7½ p.ct., less tax, in respect of the year to March 31, 1932.

The Penrith Urban Council, at their monthly meeting, decided to apply to the Ministry of Health for sanction to borrow £4400 to provide a new gasholder at the town's gas-works.

Application for a Further Loan of £10,000 is to be made by the Stockton-on-Tees Corporation Gas Committee for meters, in addition to the sanction for £10,000 for the same purpose at present before the Ministry for consideration.

South African Lighting Association, Ltd.—At a meeting of the Directors held on April 27, it was resolved to pay a dividend of 5 p.ct., less income-tax at 3s. 2½d. in the £, for the year ended Dec. 31, 1931, such dividend to be payable to-day.

The Ministry of Health have approved a scheme of re-organization at the Darwen Gas-Works, and a loan will be sanctioned when tenders have been approved. The present plant is to be scrapped, and a new vertical retort system installed. The alteration is estimated to cost £34,000.

The Annual Report of the Barrow-in-Furness Gas Department shows a loss of over £5000. The amount is £2000 less than the deficit for the previous year. Since the opening of the new gas-works at Salthouse the financial position has been steadily improving. The price of gas is to remain unaltered.

Association of Statutory Inspectors of Gas Meters.—The annual general meeting of the Association will be held in Edinburgh on Sept. 1, when a paper will be presented by Mr. W. Gordon, Chief Inspector for Edinburgh, entitled "Administering the Sale of Gas Acts in Edinburgh." On Friday, Sept. 2, a visit will be paid to the New Grange Works of Messrs. Alder & Mackay, Ltd.

Gas Production in Austria.—A return lately issued shows that there are twenty-five gas-producing undertakings in Austria, the output of which last year amounted to 13,098 million c.ft., compared with 12,763 millions in 1930—an increase of about 2·6 p.ct. The Vienna Municipal Gas-Works, which supplies gas not only to the Austrian capital, but also to sixteen small townships in the district, was responsible for over 89 p.ct. of the output.

How Our Theatres are Warmed.—The current issue (No. 218) of "A Thousand-and-One Uses for Gas" gives a "peep behind the scenes" and describes and illustrates the scientific means by which our best theatres are warmed and ventilated, how the air is cleaned before it passes into the auditorium, and how the temperature is controlled. It contains, in addition, particulars of other large buildings—museums, churches, shops, and the like—and the methods adopted for heating them.

The Summer Visit of the London and Southern District Junior Gas Association will this year be made to the Pitwines Works of the Bournemouth Gas and Water Company on Saturday, June 11. The Management of the Company have kindly arranged to convey the visitors from the Works at Poole to Bournemouth, where luncheon will be served at 1.30 p.m. The Chief Showrooms of the Company will be open during the afternoon, and members are cordially invited to inspect these.

Bristol's Progress.

Reference is made on a later page of our issue to-day to an issue of £200,000 general capital stock by the Bristol Gas Company; and in this connection the Company carried out some effective propaganda work in the local Press, in which it was pointed out that, for those who wish to place money with assurance of a secure return, there is no more attractive investment than gas stock.

Concerning the progress of the Company, mention was made of the fact that over 106,000 consumers in Bristol regularly use gas. The increase in output last year was 84 million c.ft. Nearly 4000 additional consumers were added last year, and many hundred million cubic feet are used annually by manufacturers alone. These results have been achieved, in spite of general depression, through organized management and a consistent and progressive policy.

Another interesting fact emphasized is that one recent £2,500,000 4½ p.ct. debenture issue by a gas undertaking was over-subscribed 26 times.

A Coming-of-Age Conference.

The Incorporated Sales Managers' Association attained their Twenty-First Birthday on May 16, and the Coming-of-Age Conference was opened by Sir Francis Goodenough, C.B.E., the President, at the Hotel Victoria, London, on Friday last, when H.R.H. the Prince of Wales was present to meet the members and gave an inspiring address. Among those present were Viscounts Burnham and Leverhulme and Sir David Milne-Watson.

The President Opens the Conference.

In opening the Conference, Sir Francis Goodenough said that his first and most agreeable duty was to express, on behalf of all its patrons and members and on his own behalf as President, their most grateful thanks to H.R.H. The Prince of Wales for showing his interest in their work by his presence and by his promise to address the Conference. It was but the latest of the many proofs he had given of the deep and understanding interest he took in the factors essential to the development of British trade and of his appreciation alike of the fundamental importance of trade to the life of the nation, and of the fitness of trade conducted on sound lines, as an occupation for the best of its people. No one had contributed more to the better understanding of commerce as a worthy calling and to the nation's need of an acceptance of that call to her service than the Prince of Wales.

On this coming-of-age occasion, they were glad to be able to announce a step forward that they believe had the seeds in it of great possibilities for the commerce of this country and of their Association which existed to serve it. They announced that day with great satisfaction the establishment as a branch of this Association, of a National Association for Salesmanship for the benefit of those who were engaged in the profession of salesmanship and were desirous of subsequently becoming sales managers. One of its principal aims would be to promote education in salesmanship and to provide for the examination of those aspiring to membership. Among its other activities would be the organization of an employment bureau for the assistance of its members.

He was very glad indeed that the parent Association was taking this step to assist the rising generation of salesmen; and he trusted and believed that the newly-formed organization would prove a valuable instrument for the raising of the standard of salesmanship throughout this country. It was a welcome proof of virility and initiative displayed by the Incorporated Sales Managers' Association on attaining its full manhood after an active period of adolescence.

"Sell British."

H.R.H. The Prince of Wales, in the course of his address, said: It is a great pleasure to meet again the members and supporters of the Incorporated Sales Managers' Association, and to wish you "Many Happy Returns" on your 21st Birthday. For I am firmly convinced that the work of the sales manager and the sales director is of greater importance to the country to-day than ever, and that their work must be given full recognition and unstinted support if the country's industries are to survive, revive, and flourish.

The "Buy British" campaign, to which I gladly gave

support, needs to be complemented by a well-planned and persistent effort to "Sell British," not only at home but abroad. More efficient marketing means work for the workless; and, surely, no more urgent task lies to our hands than to secure that. It is a service we owe to humanity as well as to the State. For that reason, in particular, I welcomed the final report of the Government Committee on Education for Salesmanship.

I believe that the Committee in their report put their finger on the spot in this matter of public school boys and graduates in business when they expressed the opinion that prejudice against their employment has arisen largely through the engagement of those temperamentally unsuited to commerce. So much depends on the selection of the right man for the job.

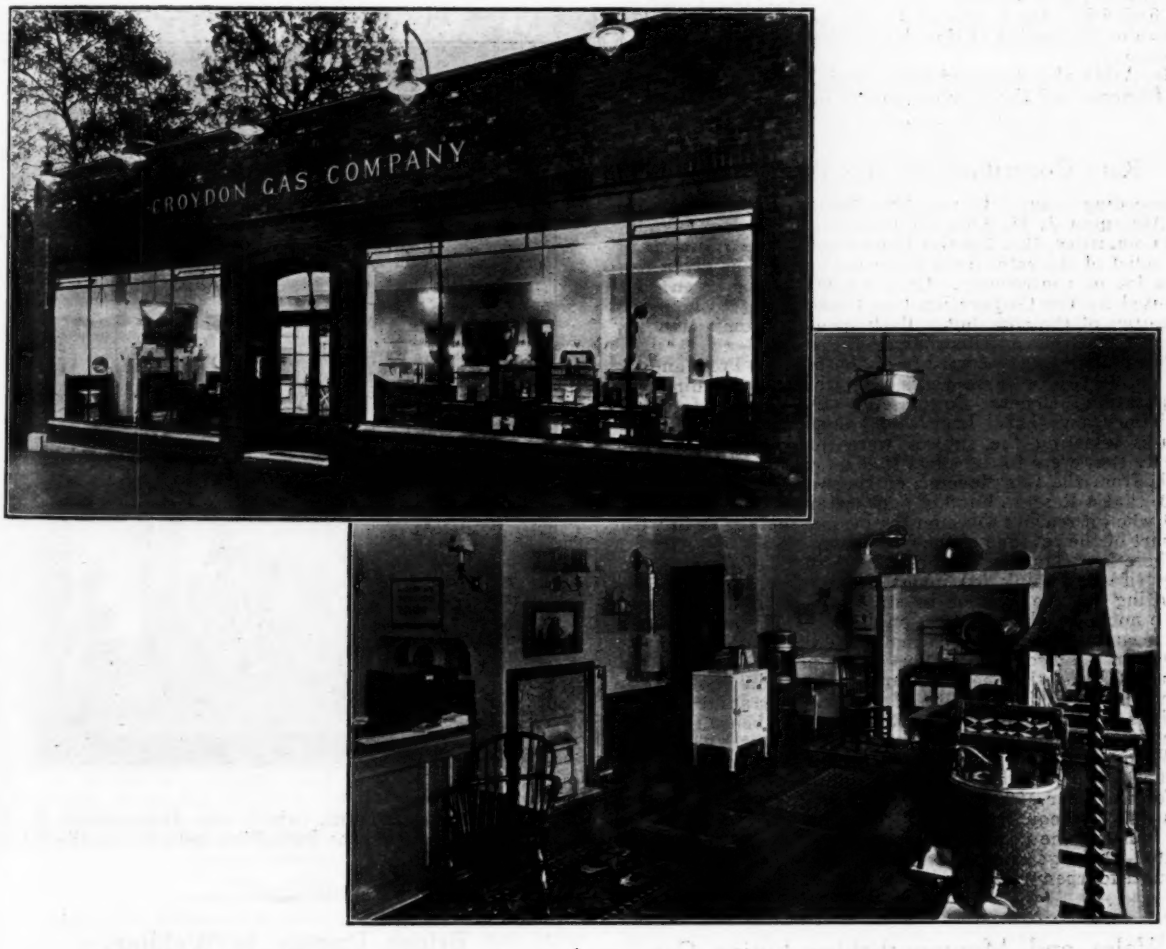
Allied closely to the question of selection is that of pay, prospects, and promotion, as to which employers are adjured by the Committee to offer such prospects, in the near as well as more distant future, as will attract the very best types of recruit for their purpose. And here let me endorse the dictum of the Committee that you cannot hope to get a first-class article at a third-rate price.

To all employers I would say very earnestly, give the rising manhood of the nation the chance to prove their worth and their enterprise. Bring into positions where they can exercise initiative, imagination, courage, and responsibility, young men at an earlier age than you have thought of engaging or promoting. If a man is not capable of taking responsibility and exercising authority and initiative by the time he is 30, there is small chance of his becoming so later. We need new blood, young blood, full of life and energy, in industry and commerce if we are to grapple successfully with the problems and competition of to-day and to-morrow, as I am confident that we can. Recruit wisely, train thoroughly and trust boldly, and our young manhood will not fail you.

I hope that this Conference may do much to further the object set forth in its theme: Creating Business Prosperity through Salesmanship.

NEW GAS SHOWROOMS AT OXTED

Croydon Gas Company's Latest Enterprise



We have been asked by the Croydon Gas Company to call attention to a slight ambiguity as affecting the window space which appeared in our article describing the new Oxted Showrooms of the Croydon Gas Company—see last week's "JOURNAL." Actually there are two windows, each 15 ft. in length by 9 ft. high, and in order to give a better impression of these windows a further illustration accompanies this note. It will be noticed that the actual window space is considerable in relation to the overall dimensions of the showroom portion of the building. We take the opportunity of supplementing our illustrations last week with a view of bathroom end of these attractive showrooms.

THE NEWS—*continued.*

Gas and Industry.

The second of the three lectures on the uses of coke oven gas for industrial purposes was given at the Rotherham College of Technology on May 4, when the lecturer was Mr. F. L. Atkin, A.M.I.Mech.E. (Industrial Heating Section, City of Birmingham Gas Department). Mr. Atkin's subject was "The construction, maintenance, and repair of furnaces, with particular reference to the use of coke oven gas."

Prof. Douglas Hay presided, and among those present was Mr. J. T. Haynes, Engineer and General Manager to the Rotherham Gas Department.

Prof. Hay said he greatly appreciated the enterprise of the Rotherham Corporation Gas Department in arranging the lectures. The subject of the lectures was interesting and vital to people living in the Rotherham area.

Mr. Atkin traced with the aid of diagrams the development of the modern gas furnace from the bunsen burner. He said he would divide industrial apparatus into two groups—first, apparatus for working temperatures up to 550° C., and secondly, for working temperatures of over 550° C. Little could be said regarding the maintenance and repair of the first group, other than to follow the dictates of common sense, such as burner cleaning, adjustments to the flue, taking such safety precautions as were necessary, and the installation of a thermostatic control. Furnaces for working temperatures of over 550° C. comprised such types as annealing, re-heating, hardening, carburizing, and melting furnaces, together with a number of special purpose furnaces.

The causes of the necessity for repairs to furnaces were chiefly the mechanical wear and tear of the floor, the choking of the gas ports and combustion chambers, by iron scale and its subsequent product, slag, disintegration and spalling of the brickwork surface, and the actual fusion of the firebrick. There appeared to be no direct relationship governing the period of time lapsing before repairs became necessary.

Mr. Atkin also discussed the materials of construction of gas furnaces and the requirements of insulation materials.

Rate Contributions and Gas Profits.

According to the "Birmingham Mail," a recent reminder by Alderman J. H. Lloyd, Chairman of the Birmingham Gas Committee, that the Gas Department's contributions to the relief of the rates must cease next year, has given rise to a lot of controversy. Over £1,500,000 has been contributed by the Corporation Gas Undertaking to help the amenities of the city, but a Parliamentary Committee has decreed that the contributions must cease.

This matter was discussed freely both in the Press and by the public two or three years ago, when the Birmingham Corporation's General Powers Act (1929) was before the Parliamentary (Local Legislation) Committee, and certain clauses affecting the subject were included in the Act. Briefly they were to the effect that no contribution shall be made from the Gas Revenue to the rates after March 31, 1933, that a Reserve Fund of £200,000 shall be created, and that when it reaches this sum the income shall be dealt with as part of the revenue of the Gas Undertaking.

There is a clause which provides that "The Corporation may (if they think fit) invest the reserve fund and the resulting income thereof in statutory securities or may place not more than £50,000 on deposit with their bankers and accumulate the same at compound interest."

During the discussion in 1929 it was pointed out that the trend of legislation had for some time been against the principle of taking profits of municipal trading undertakings for the relief of the rates, the view being that service should be given at the lowest possible cost.

When the reserve of the Gas Committee has reached the £200,000, the gas is to be supplied at cost.

For the year 1930-31 the contribution from gas profits was £41,200 (equal to a rate of approximately 1¾d.). In the 'nineties the yearly contribution was over £70,000, and in 1911-12 the grant exceeded £80,000—a sum then equal to about a fourpenny rate.

Wales and Monmouthshire Junior Gas Association.

The Annual General Meeting of the Association was held at the Gas Offices, Bute Terrace, Cardiff, on Saturday, April 30, when Mr. S. E. BRETT (President) occupied the chair.

After the usual preliminaries, the HON. SECRETARY (Mr. H. S. Bartlett) read the Tenth Annual Report of the Council, covering the activities of the past session. The Report was adopted, proposed by Mr. C. H. COLLINS (Swansea) and seconded by Mr. R. T. MILLS (Cardiff).

The Financial Statement was submitted by the HON. TREASURER (Mr. B. J. Bell, Cardiff), who outlined the items of income and expenditure and showing a balance in hand of £1 7s. 4d. The accounts were adopted, on the proposition of Mr. E. E. MOORE (Swansea) and seconded by Mr. P. J. WRIDE (Swansea).

The election of officers then took place and resulted in the following being elected for the Session 1932-33:

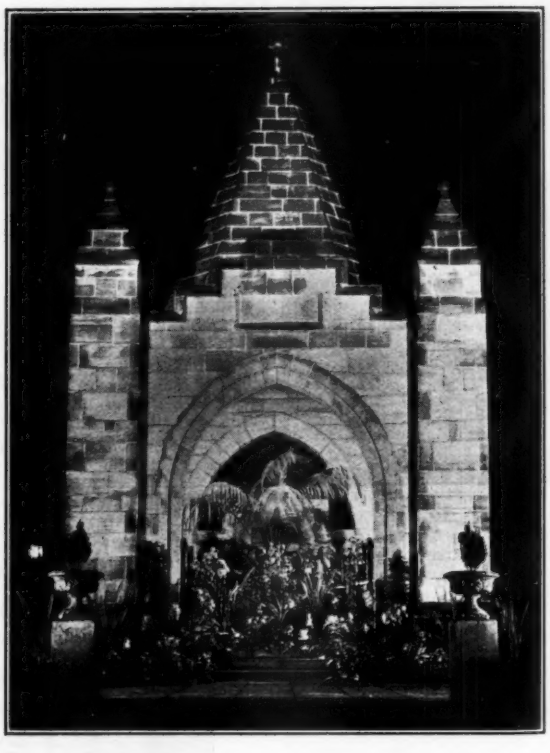
President.—Mr. C. S. Thane, Newport.
Senior Vice-President.—Mr. H. S. Bartlett, Cardiff.
Junior Vice-President.—Mr. A. D. Howells, Neath.
Hon. Treasurer.—Mr. B. J. Bell, Cardiff.
Hon. Secretary.—Mr. R. S. Snelling, Newport.

There were two vacancies on the Council, and these were filled by the appointment of Mr. J. C. Chapman (Swansea) and Mr. H. Williams (Cardiff). Messrs. A. W. Stickler and T. SMITH were thanked for their services, and again elected as Auditors.

Members then adjourned for tea kindly provided by the Management of the Cardiff Gas Light and Coke Company, and a vote of thanks for their hospitality was proposed by Mr. C. S. THANE and seconded by Mr. C. H. COLLINS.

Flood-Lighting of War Memorial.

The accompanying photograph, kindly forwarded by Mr. A. Mackay, Engineer and General Manager to the City of Stoke-on-Trent Gas Department, is of the War Memorial at



Longton, Stoke-on-Trent, which the Department floodlighted by gas during the Park Fêtes held during the Whitsuntide week-end.

British Practice in Welding.

In a paper on "British Practice in Welding of Steel Structural Work," which was presented by Mr. James Caldwell on Friday last at the Paris Congress of the International Association of Bridge and Structural Engineering, the author stated that welding by means of the oxy-acetylene blowpipe has not met with much support in Great Britain for the assembly and the reinforcement of steel structures, but electric arc welding has developed into

general practice. The results and progress of British pioneering have been particularly marked in Belgium, Switzerland, and Australia, based on the application of the heavy coated electrode.

The production of a metallurgically sound weld under practical conditions should not depend entirely on the skill of the operator but in the natural function during fusion of the electrode. Success in welded construction depends on the initiative shown by the designer and his ability to break away from existing practice developed essentially for riveting. Attention is directed to the design of welded structures on a monolithic basis with a general use of butt welded joints, even in main members. With light single run fillet welds contractional stresses are reduced to a minimum and the soundness of the weld can be judged by expert visual inspection. More is now known of the behaviour of welded joints than of riveted joints. It is inaccurate to say that riveted joints can always be guaranteed after inspection by established methods.

In framing regulations one of the most important factors to be considered is "allowable stresses" or "factor of safety," which if too high is quite sufficient in itself to prohibit or seriously limit the welding of structural steelwork on economic grounds. The determination of the static strengths of welded joints is of secondary importance except for use in design. Factors that deserve more attention are the resistance of welded joints to dynamic stresses, corrosion, solidity, and ductility in the weld metal, and, above all, "consistency under practical conditions" to ensure reliability.

Cumberland and Westmorland Gas Managers' Association.

A Meeting of this Association was held at Penrith on Friday, May 20, under the Presidency of Mr. Hedley Hoy, of Workington. A letter was read from Mr. W. B. Hetherington, late of Keswick, resigning his post as Hon. Secretary to the Association, on account of ill-health. The members received this with very much regret, and placed on record the valuable services Mr. Hetherington had rendered since the inception of the Association.

An informal discussion took place on various matters affecting the members.

On the motion of Mr. Hedley Hoy, seconded by Mr. A. F. Young (Cockermouth), Mr. J. Corrigan (Penrith) was elected President for the year 1932-33. Mr. A. F. Young was elected Vice-President on the motion of Mr. J. E. Blundell (Carlisle), seconded by Mr. F. Fawcett (Egremont).

The position of Hon. Secretary was accepted by Mr. F. G. Bowness (Maryport), proposed by Mr. Hedley Hoy and seconded by Mr. J. Denham (Whitehaven).

After the meeting the Penrith Gas-Works were inspected and particular interest was shown in the internally spiral-guided holder which is at present grounded and awaiting dismantling. It was erected in 1892, and as far as can be ascertained is the only one of its type remaining in the country.

NOTES ON PLANT AND PROCESSES

Economic Enamelling for the Gas Industry.

Good enamel is an important selling asset to gas undertakings, in that the necessary delicacy of manufacture can better be obtained on the mass-production scale essential to low cost by means of gas than by any other method; for both the preparation of enamel and its subsequent fixing must be very carefully controlled.

In the pages of an interesting booklet recently published by Messrs. National Enamels, Ltd., of Norman Road, Greenwich, S.E. 10, is described and illustrated the process that has been evolved by the firm. One is able to follow the evolution of a piece of iron sheet into elaborate enamelware such as is so widely used in gas appliances—and this in a factory specifically organized to meet the Gas Industry's needs and itself operated throughout on the Industry's products.

Beginning with the sheet-iron the story is traced of a gas cooker tray or lining plate. When the sheet has been cut into accurate over-all dimensions it passes to the machines (gas engine driven) that will work it into the correct shape and detail. The sheets are next cleansed in acid baths, dried, and are ready to pass to the enamelling shop.

The preparation of the enamels forms an interesting section, and a photograph shows a corner of the research laboratory, where the exact proportions of ingredients are decided and all raw material tested. The application of the enamel is next dealt with—first, the primary coat, followed by fusing in muffle type furnaces, heated by gas coke to a temperature of 850° C., and then, after cooling down, the finishing coats, after which the trays go to the inspection room before packing.

In another department the firm have gas-heated furnaces for articles that need special temperature control, such as the high-pressure gas lamp reflectors which the company produce.

Messrs. National Enamels, Ltd., were organized specifically, as has been mentioned, to deal with the enamel problems of the Gas Industry. The factory is itself operated by the Industry's products and is directed with a full knowledge of the Gas Industry and its needs. In addition, it is of interest to note that a profit-sharing scheme is in operation among the workpeople.

"Parafilm."

Considerable attention is being displayed by the Gas Industry in the new protection against corrosion now being offered under the name of "Parafilm." British by invention and manufacture, it departs from the customary practice of using a textile as a means of conveying a protective medium. The value of paraffin wax as a protective has been utilized, and the difficulty of application overcome by manufacturing it in the form of an elastic ribbon which grips the pipe by reason of the elasticity and forms a covering which will effectively resist attacks of acids, alkalis, and electrolytical action. This combination of the different materials, we are informed, is such that the wax never hardens or cracks, and the elasticity is unimpaired by age or frost.

Tested by the recognized laboratory method of determining the electrical resistance, no passage of current takes place even when immersed in strong electrolytes for a long time. It is clean and easy to handle and has the advantage of low price, the cost of covering a lineal yard of ¾-in. pipe being just over one penny.

Although only a thin ribbon is used, tested by having stones dropped on to a wrapped pipe and dropping a wrapped pipe on to concrete, no cracks or breaks took place.

Messrs. Paul Winn & Co., Ltd., 40, Trinity Square, London, E.C. 3, are handling the product on behalf of the patentees, the Pipe Protection Company, Ltd., and they will be pleased to supply samples and prices.

Robinson's Gas Meters.

A catalogue recently received from Messrs. J. H. Robinson & Co. (Liverpool), Ltd., of Mill Lane, Old Swan, Liverpool, indicates by description and illustration the marked advance this firm have made in gas meter design and construction.

Robinson's "flexible output" meter, which is described in detail, is designed for strength and maximum efficiency, and supplied with open or closed top as desired. Illustrations show the operating parts, the special shape of the valves, and the design of the lubricating system for all moving parts. The valve was designed to obtain a maximum area of opening for a given movement of the valve cover and to enable peak loads to be measured without causing outlet fluctuation of pressure. Graphs reproduced show the results of a "flexible output" meter passing gas at varying rates of flow from 5 to 700 c.ft. per hour, with pressures fluctuating from 3 in. to 54 in. which has been running for many months. It has passed over 2,500,000 c.ft., and ten tests, made at intervals, have shown the meter accurate at each test.

An interesting series of photographs show the various meter parts, with an appropriate key to each.

The catalogue goes on to describe the firm's standard prepayment attachment and the "Midget" check meter, ordinary or prepayment, which is designed to record the volume of gas used by a large gas fire or boiling ring, and can be placed in a small cabinet. It is thus suitable for hotels, flats, boarding or apartment houses, while it is also useful as a rebate or discount meter where different prices are charged for lighting and heating.

Final tables give the overall dimensions of the various sizes of meter produced by the firm, together with specification of materials used.

GASHOLDER AND TANK : : RIVETED JOINTS : :

A Graphical Analysis
By S. M. MILBOURNE, A.M.I.Struct.E.

Although the calculations involved in the design or analysis of a riveted joint are generally of a simple character, yet the arithmetical computation is somewhat tedious, especially when practical considerations affecting the pitch and diameter of rivets require to be observed. In a number of cases, such as are frequently met with in gasholder design in which the width of sheeting or plating to be jointed is already given, it may be found necessary to alter either the pitch, the diameter of the rivets, or even the thickness of plating from that originally proposed, in order to satisfy the desired conditions of strength and economy. The following graphical method of analysis facilitates the design of most forms of riveted joints and enables the efficiency to be readily estimated without tedious calculation.

Fig. 1 illustrates a number of the more general types of riveted joint adopted in gasholder design.

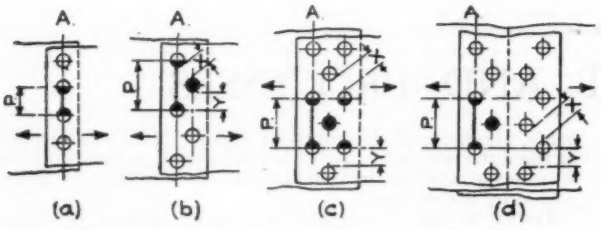


Fig. 1.

These joints may be briefly described as follows:

(*a*) Single riveted lap joint.
(*b*) Double riveted lap joint.
(*c*) Treble riveted lap joint.
(*d*) Double riveted double butt joint.

As the width and thickness of butt straps, the centres of the longitudinal lines of rivets, width of lap, &c., are dealt with in most text books, it is scarcely necessary to deal with these conditions in this instance, as they do not influence the joint efficiency so long as the proper proportions are maintained and the distance X representing the diagonal pitch between the rivets is not less than the distance Y on the line pitch. The principal types of failure of riveted joints may be briefly enumerated as follows:

(1) Shearing of the rivets.
(2) Crushing of the plate in front of the rivets, or crushing of the rivets.
(3) Tearing along the lines of rivets through "A" in fig. 1 (*a*) (*b*) (*c*) (*d*).

It will be observed that the failure of the joint as described in (1) and (2) concerns the rivets only. The shearing strength of the rivets (1) and the crushing strength of the rivets or plate (2) may therefore be expressed mathematically in terms of the diameter of the rivet (*d*) in inches, the crushing stress (f_c) in tons per square inch, and the shearing stress of the rivet (f_s) in tons per square inch as follows:

$$S = \frac{n\pi d^2 f_s}{4} \quad \ldots \quad (1)$$

$$C = ndtf_c \quad \ldots \quad (2)$$

where n = the equivalent number of rivets included in the rivet system or group between pitch P—see fig. 1. The group of rivets is shown in black. [Rivets in double shear are equivalent to twice the number (n) in single shear, but this obviously only applies to the values of S in equation (1).]
t = the thickness of plate in inches.
S = the total shearing strength in tons of the rivets included in group.
C = the total crushing strength in tons, of rivets or plate in front of rivets in group.

The strength of the plate between the rivets distance P in inches may be written as follows:

$$T = (P-d)\,tf_t \quad \ldots \quad (3)$$

where f_t = the tensile stress in the plate in tons per square inch.
T = the total tensile strength of the plate between the maximum pitch of rivets P.

In order to ascertain the efficiency of a riveted joint, the strength (T_1) of the solid plate of width P inches is required. This may be determined from the equation

$$T_1 = Ptf_t \quad \ldots \quad (4)$$

From these equations it will be seen that when the type of joint has been decided in designing, for any given thickness of plate, the values obtained from equations (1) and (2) will become constant quantities, while the pitch P of the riveting may be varied.

To obtain the maximum efficiency of joint (provided the pitch is not restricted) the equations may therefore be written

$$(P-d)\,tf_t = S \text{ or } C \quad \ldots \quad (5)$$

The lowest value obtained from equations (1) and (2) is taken. The most favourable pitch of the rivets may therefore be determined by equating for P in (5).

Then

$$Ptf_t - dtf_t = S \text{ or } C$$

$$\therefore Ptf_t = S + dtf_t \text{ or } C + dtf_t$$

$$\therefore P = \frac{S + dtf_t}{tf_t} \text{ or } \frac{C + dtf}{tf_t} \quad \ldots \quad (6)$$

The efficiency of a riveted joint for any value of P is determined from the lowest value of any of the three expressions S/T_1, C/T_1, and T/T_1. Now it follows that as S and C are constant quantities for all values of P and the values of T and T_1 vary uniformly with P, the equations (1), (2), (3), and (4) may be expressed graphically by straight lines as shown in fig. 2. The strength of the rivet group is measured off on the vertical axis OY. The horizontal line AB indicates the constant value S or C for all values of P. The pitch P of the rivets is measured off on the horizontal axis OX. If equation (3) giving the value of T is plotted then the graph will be represented by the straight line CD. The distance OC is of course equal to the diameter (*d*) of one rivet (when P = *d* in equation (3) then T = O). The graph of equation (4) giving the value of T_1 is represented in fig. 2 by the straight line OE.

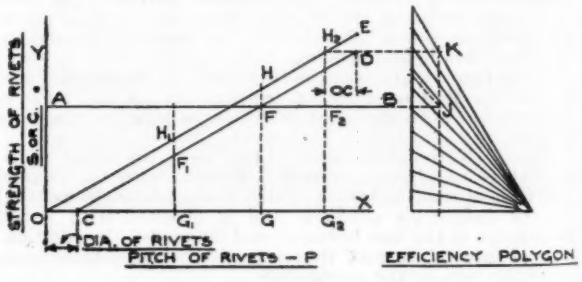


Fig. 2.

It will now be observed that at the point F where CD cuts AB, S or C = T. If a perpendicular be dropped from F cutting OX in G, then GO represents the value of the pitch P at which the joint reaches its maximum efficiency. The ratio of strength of the joint to that of the solid plate may be readily ascertained by extending GF to point H in OE. Then the joint efficiency for this particular pitch of rivet group P will be FG/HG. Similarly the efficiency of the joint for any other pitch of rivet group may be read off the graph directly. When P = OG_1 then the efficiency will be

F_1G_1/H_1G_1. In order to facilitate the determination of the joint efficiency in terms of a percentage, a ray vector polygon is arranged on the right of the graph so that by producing the measured ratios from the graph to the polygon in the manner shown in fig. 2, the percentage efficiencies may be at once read off. In the example shown (F_1G_2/H_2G_2) a horizontal is drawn from H_2 cutting the hypothenuse of the polygon at point K. A perpendicular is then dropped from K cutting AF_2 projected at point J. The position of this point on the scale of percentages gives the efficiency of the joint. (If the percentage polygon is drawn out on a separate sheet of transparent material it can then be moved into position over the graph and the efficiency read directly.)

Diagrams 3 and 4 show the manner in which the ordinates and abscissæ are measured off on the OY and OX axes respectively in terms of the strength values of the rivets and the thickness of plate. This arrangement eliminates the necessity of calculating values of equations (3) and (4) in order to prepare the graphs.

Diagram 3 is arranged for the graphical analysis of riveted joints for sheeting and plating up to $\frac{3}{8}$ in. thick and P = 4 in. Diagram 4 is arranged for the graphical analysis of riveted joints for plating up to $\frac{3}{4}$ in. thick and P = 9 in. It will be appreciated that for the thinner plates and sheets more accurate results are obtained from Diagram 3 since this is prepared to a larger scale.

Diagrams may be prepared in a similar manner reading up to any desired thickness of plate, but they should be constructed to as large a scale as possible.

In calculating the corresponding thicknesses of plates the stress f_t has been taken as 7·5 tons per square inch. The value of S or C may be calculated from equations (1) or (2) or read from tables for any desired stress f_s or f_c.

A type of joint very common in tank work which requires special treatment is the treble riveted butt joint with extended inner welt as shown in fig. 5.

This class of joint may fail by tearing of the steel plate between the rivets in line A, and its graphical analysis in this case presents no difficulties. But under certain conditions of stress it may be shown that failure of this type of joint may occur by shearing of the rivets or crushing of rivets or plate at (*a*) (*a*) and tearing of the plate between

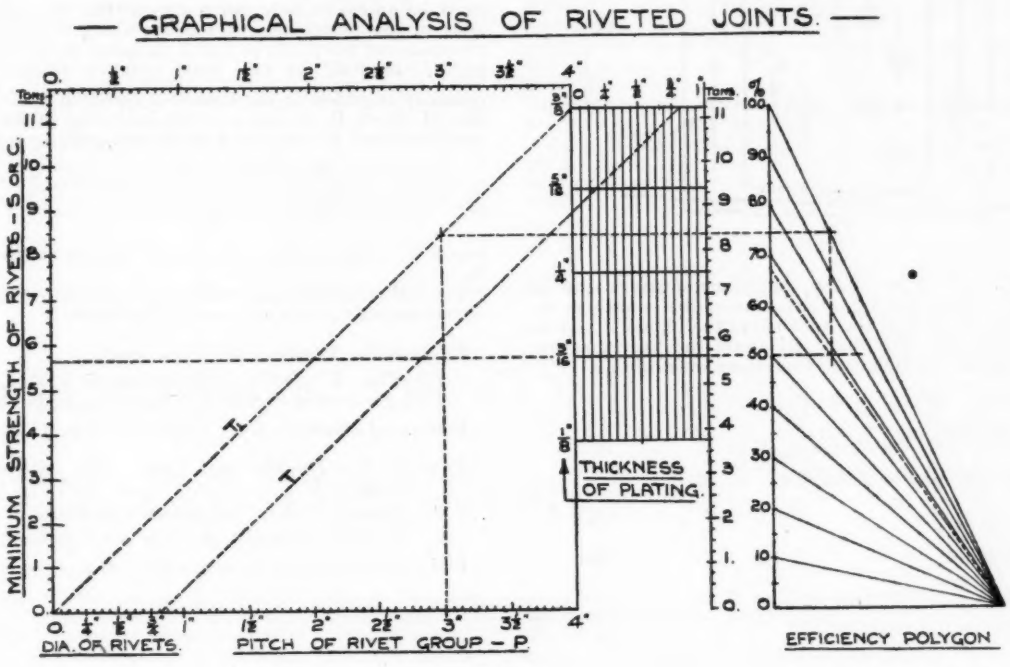

GRAPHICAL ANALYSIS OF RIVETED JOINTS.
MINIMUM STRENGTH OF RIVETS - S OR C.
Tons
THICKNESS OF PLATING.
DIA. OF RIVETS
PITCH OF RIVET GROUP - P
EFFICIENCY POLYGON

FIG. 3.

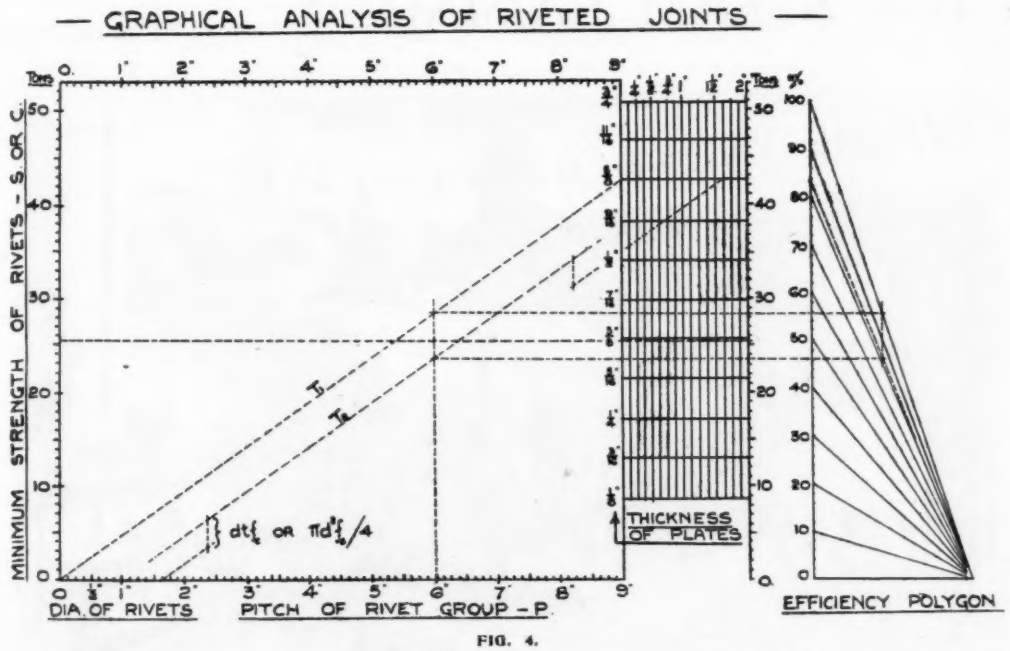


FIG. 4.

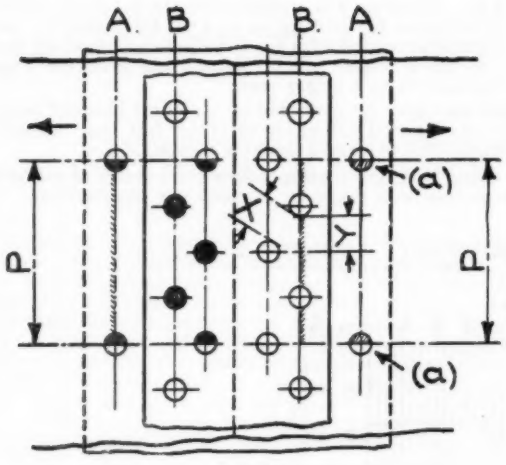


Fig. 3.

the line of rivets at B. These conditions of stress may be readily ascertained from consideration of the equations expressing the strength of the joint along the planes A and B. In order that the joint may fail along the line A rather than through B, the following conditions must obtain:

$$(P-d)tf_t \leq (P-2d)tf_t + dtf_c \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

or $$(P-d)tf_t \leq (P-2d)tf_t + \pi d^2 f_s/4 \quad . \quad . \quad . \quad . \quad . \quad (8)$$

These equations may be reduced to

$$f_t \leq f_c \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7a)$$

and $$tf_t = \cdot 7854 df_s \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8a)$$

If $f_c > f_t$ equation (7*a*) may be eliminated, also if $f_s = 5{\cdot}5$ tons per square inch, then equation (8*a*) may be written

$$d \geq 1{\cdot}736t \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8b)$$

If this condition does not obtain, then it is evident the joint will fail through plane B. In this case the usual graphical analysis may be applied by marking off on the pitch line a distance equal to two rivets. Since, however, failure along the plane B cannot take place without shearing or crushing of the rivets at (*a*) their strength value must be added in order to represent the equivalent resistance of the plates against tearing along the line B. The resistance of the rivets in line A included in the pitch P will be dtf_c or $\pi d^2 f_s/4$ (the least value is taken), and this quantity is added to the tensional strength of the plate on line of rivets B, in the manner indicated in fig. 4. This condition may be expressed mathematically as follows:

$$T_2 = (P-2d)tf_t + dtf_c \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (9)$$

or $$T_2 = (P-2d)tf_t + \pi d^2 f_s/4 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (10)$$

where T_2 = the equivalent strength of plate on line of rivets B.

The following examples will serve to illustrate the method of estimating the efficiency of riveted joints:

Example I.—Double riveted lap joint.

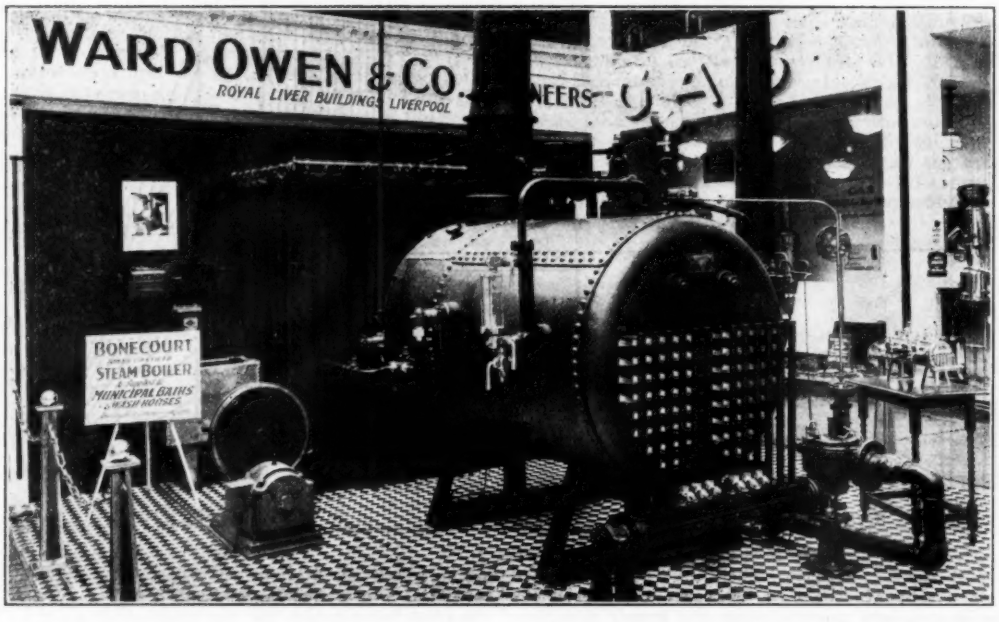
$t = \frac{3}{8}$ in., $d = \frac{13}{16}$ in. (after closing), P = 3 in.
n = 2 rivets in single shear or 2 rivets for bearing.
Estimated efficiency from graph = 67·5 p.ct. (see fig. 3).

Example II.—Double butt joint with extended inner strap.

$t = \frac{5}{8}$ in., $d = \frac{13}{16}$ in. (after closing), P = 6 in.
n = 9 rivets in single shear or 5 rivets for bearing.
Estimated efficiency from graph = 83 p.ct. (see fig. 4).

GAS FOR STEAM RAISING

Modern Developments Demonstrated



A feature of particular interest to gas undertaking engineers and municipal authorities generally was shown at the Public Baths, Wash-Houses, and Municipal Services Exhibition held at the City Hall, Deansgate, Manchester, during the period from Tuesday, May 3, to Wednesday, May 11. It was an exhibit by Messrs. Ward, Owen, & Co., in conjunction with Messrs. Town Gas Boilers (Bonecourt), Ltd.

The exhibit comprised a large gas-fired steam (Bonecourt) boiler, complete with full automatic controls. The boiler was capable of raising 1400 lbs. of steam per hour at a maximum pressure of 120 lbs. per sq. in. An important point in connection with the plant was an entirely new damper device which automatically closed a damper when gas was reduced, thereby effectively preventing the inrush of cold air, and thus further increasing the efficiency of the plant. Alternatively, the damper opened as soon as the pressure increased. The unit may be regarded as "fool-

proof" inasmuch as should the supply of current fail, which causes the solenoid to function, the damper automatically opens.

Other automatic controls fitted to the boiler comprised a standard automatic gas control which operated according to the desired steam pressure. Another important consideration was the provision of an automatic feed-water control, comprising a float chamber which contained a "Mono-metal" ball-float operating a mercury switch controlling a small motor-driven feed pump. Incorporated in the unit was a low-water gas cut-out. This had the effect of reducing the gas to a by-pass in the event of the pump or water failing.

A large number of the boilers are at present being supplied in the North, and it is of interest to note, also, that several units have recently been supplied for use by municipal and other local authorities in connection with public baths and wash-houses.

Two of these installations have been supplied recently to the Burnley Corporation for their Central Baths, and they are replacing two coal-fired boilers. The exhibit at Manchester was supplied to the Bolton Education Authority for use in connection with a swimming bath at the Whitecroft Road Schools. Furthermore, Messrs. Ward, Owen, & Co. have supplied a very large unit to the Blackburn Corporation Transport Department for heating a new 'bus garage.

The firm have also orders on hand for other municipal authorities for heating schools and other public buildings generally, among them being commitments for the Warrington Education Authority, the Nelson Education Authority, the Rochdale Corporation, and the Lancaster New Public Library.

The plants have long since passed the experimental stage, and it is interesting to note that some have been in use in the Manchester area for a number of years and are giving complete satisfaction. As a matter of fact, there are over 200 of the plants in operation in Lancashire alone.

As a result of exhibiting the plant a large number of inquiries have been received and visits of inspection made, thus causing Messrs. Ward, Owen, & Co. to feel every confidence that substantial business will result ultimately.

CONSUMPTION OF COKE BREEZE ON THE WORKS

*Abstract Translation of a Discussion by A. Kolar**

Coke breeze is regarded as the material below $\frac{7}{16}$ in. The fact that, in spite of its good calorific value, breeze commands a much lower selling price than lump coke, necessitates all possible precautions to minimize breeze formation and renders advisable the use of this material on the works wherever it can replace larger coke.

The very fine fractions (below 0·08 in. size) present in the breeze, and especially the material collected from the settling pits in which the quenching water is clarified, have a very high moisture content which may reach 30 p.ct. and are responsible for much of the trouble associated with the use of breeze since, when breeze is burnt under boilers or gasified in producers, the fines tend to be carried forward as dust.

Coke breeze may be used for the following purposes on the works:

(1) For the direct firing of boilers.

(2) For gasification in producers, either alone or admixed with larger coke.

(3) As an addition to the coals carbonized, especially when these are of a strongly coking nature.

(4) For the manufacture of briquettes.

The Vienna gas-works, in 1930, employed for all purposes, including bye-product recovery, one ton of steam for every 27,000 c.ft. of gas made. Of this quantity, 42 p.ct. was produced in waste-heat boilers and 58 p.ct. in solid fuel boilers.

When boilers are fired with coke, preheating of the air is inadvisable if excessive temperatures and slag formation are to be avoided. The rate of development of heat in the grate can be higher with breeze than with large coke, owing to the greater surface exposed by the former. The relative figures under normal conditions are 320,000 and 200,000 B.Th.U./sq. ft. of grate area/hour respectively, coal occupying an intermediate position.

At Vienna, Babcock & Wilcox boilers with Pluto stokers are employed. They are fired with a mixture of 15 p.ct. of coal dust and 85 p.ct. of breeze and an evaporation figure of 5·4 lbs. of steam (190 lbs. pressure, superheated to 660° Fahr.) per pound of fuel of calorific value 9200 B.Th.U./lb. is obtained, the combined efficiency of the feed water preheater, the boiler and the superheater being 74·7 p.ct. In an extension of the plant, grates of the cascade type were installed, and these enabled the breeze to be used without addition of coal. The continuous motion which is imparted to the fuel brings the latter into intimate contact with the combustion air and minimizes formation of large pieces of clinker and inclusion of unburnt carbon in the clinker. The heat developed per sq. ft. of grate area per hour is as high as 550,000 B.Th.U/sq. ft./hour, and the overall efficiency is 72·1 p.ct. The grading of the coke is +0·4 in., 3·7 p.ct.; 0·4-0·2 in., 30·0 p.ct.; 0·2-0·08 in., 29·8 p.ct.; 0·08 in.-0, 36·5 p.ct.

An illustrated description of various types of grates and stokers is given. With the cascade grates, steam production is 15 p.ct. cheaper than with the Pluto stokers. The latter are specially suitable for taking care of the average load, whereas the former not only serve this purpose but also meet peak load demands.

The Martin backward thrust grate which moves the upper layers of the fuel bed in an opposite direction to the lower layers has only been developed recently but has become widely adopted in Germany.

To overcome the difficulties attending the use of breeze in producers, the following requirements must be fulfilled.

(1) The grate must be such that the air-steam mixture is distributed over the whole cross-section of the producer.

(2) The resistance of the fuel bed must be uniform over the whole cross-section. This may be achieved either by intimately mixing the fuel or by feeding the graded coke in layers. If segregation of the fuel occurs, the air and steam follow the path of least resistance.

(3) The producer gas should be withdrawn centrally from the producer just as is the case with the admission of the air and steam.

Coke breeze was gasified in Kerpely producers in Vienna as long ago as 1912, but the throughput was small, a drawback being the depth of the fuel bed. It is of interest to note that Kerpely recognized the importance of a restriction in the producer shaft and that he employed a hanger cylinder to enable a constant fuel-bed thickness to be maintained.

More recently, attempts at the gasification of coke breeze and especially of coke breeze added to larger coke were resumed. When segregation of the charge occurs, the larger sizes collect at the periphery and the air meets with a higher resistance at the centre than at the walls. This can lead to production of flame at the walls. To overcome this, Koppers introduced a rotary feed distributor which charges the coke continuously over the surface of the fuel bed, the bed being higher at the walls than at the centre. Segregation of the mixture of breeze and small coke is thus prevented.

Information is given as to the results obtained at Vienna and elsewhere with mechanical producers of the Koppers, Koller, and Marischka types with data covering the grading of the breeze.

With Koppers producers, the effect on the throughput of

* "Das Gas- und Wasserfach," 1932, 75, 255-262 (April 2).

the presence of increasing amounts of breeze (0·4 in.-0) in the small coke (1·2 in.-0) is shown in the following table, which gives the throughputs in tons/24 hours for producers of different diameters.

Internal Diameter, Ft.	Percentage of Material, 0·4 In.-0.				
	0	10	20	30	40
5·2	12	11	10	8	
6·9	21	20	18	16	13
8·5	30	28	26	23	19
9·8	37	35	32	28	23

In the case of the Koller producer of diameter 8·5 ft. and a Koller grate, a throughput of 14·3 tons/24 hours was obtained with a mixture of small coke and breeze of grading 0·6 in.-0·4, 36·0 p.ct.; 0·4 in.-0·04 in., 51·0 p.ct.; 0·04 in.-0, 13·0 p.ct.

With a 9·8 ft. diameter Marischka producer and a Koller grate and a mixture of 75 p.ct. small coke 1 in.-$\frac{7}{16}$ in. and 25 p.ct. breeze, the throughput was 32 tons/24 hours.

In the case of this producer, the coke hopper was filled by successive additions of $\frac{1}{2}$ ton breeze and $\frac{1}{2}$ ton small coke, the next charge being 1 ton of small coke. With the small coke alone, the throughput was 53 tons/24 hours.

The crushing and blending plant at Vienna enabled the range of coals suitable for carbonization to be extended and provided the possibility of adding coke breeze to reduce the swelling properties of some of the coals and, in certain cases, to improve the coke quality. For several years, the fine coke collected from the settling pits in which the overflow quenching water from the chamber ovens is clarified has been added, after air drying, to the coal, its amount being about 1 p.ct. of the coal. In 1930, 3000 tons of this fine material were used in this way. With the coal in use, even an addition of 3 p.ct. of fine coke does not impair the coke quality.

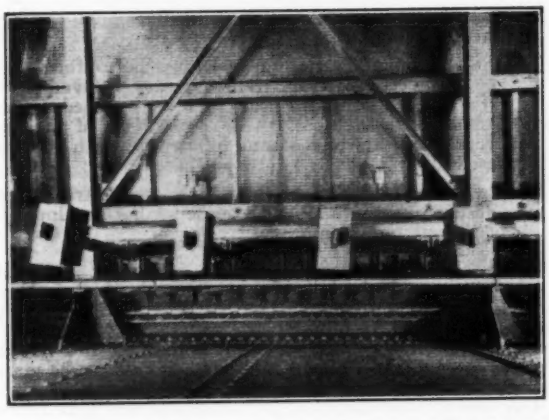
The production of briquettes from breeze was investigated, but was not found to be an economic proposition in view of the nature of the fuel market in Vienna.

WORLD'S LARGEST KLÖNNE - - - HOLDER* - - - -

The new 6 million c.ft. Stacey-Klönne holder at Syracuse

A striking example of the great advances in the design and engineering of new equipment that is being developed and used by the Gas Industry is the new 6,000,000 c.ft. Stacey-Klönne piston type dry seal gasholder just completed for the Syracuse Lighting Company, of Syracuse, N.Y., by the Stacey Brothers Gas Construction Company, Cincinnati, Ohio. Introduced from Germany, this Syracuse holder is the largest of its design in the world, and is the first of this type to be completed on the Western Hemisphere.

The Stacey-Klönne waterless piston type gasholder is a German invention and the first holder of this type was built about 1927 by August Klönne. The savings and advantages of this type of holder made it popular immediately, resulting in the erection in Europe and Africa of some 45 holders of this design with an aggregate capacity of about 50 million c.ft. That the temperature does not affect the efficiency of this type of holder construction is demonstrated by the successful operation of these holders in Siberia as well as in northern Africa.



Section of seal showing position of piston, dilatable ring which supports seal, weights and lever arms, lower roller, and interior of holder shell.

The exclusive rights for the manufacture of these holders in America are held by the Stacey Brothers Gas Construction Company, who also have a 4 million c.ft. holder of the type under construction for the Consumers Gas Company of Reading, Pa., and a 1½ million c.ft. holder for the Consumers Power Company of Kalmazoo, Mich.

The Stacey-Klönne seal or packing ring consists of an expansible, dilatable sheet steel ring suspended from the structural framework of the piston, to which is attached a specially prepared gas-resisting packing, made up of seven layers of cotton fabric vulcanized with a gas-resisting compound and faced with leather on the lower side where it comes in contact with the gas. This packing is lubricated by a special grease to facilitate movement of the piston in the holder shell. The packing is pressed firmly against the holder shell by means of closely spaced counterweight lever arms. The lower edge of this expansible sealing ring is connected to the outer edge of the piston structure by a strip of sheet lead covered with fabric, forming a gas-tight, flexible connection, and permits the packing ring to expand and contract, and follow the contour of the shell at all times.

The Syracuse holder shell is 188 ft. in diameter, 251 ft. high to the top of the shell, and is covered with a spherical roof on the centre of which is built a 20-ft. diameter dome in which are housed the interior elevator and other equipment used for securing access to the interior of the holder. The holder shell is made up of $\frac{7}{16}$-in. steel plates, reinforced by 36 vertical 9-in. I-beams spaced 16½ ft. apart along the circumference and by 5 by 3½ by $\frac{5}{16}$-in. horizontal angle rings spaced about 5 ft. apart vertically. In addition there are seven 4-ft. wide horizontal girders or balconies about 36 ft. apart. The shell plates are butted at the columns and riveted to them and to the circular angle stiffeners, with all rivets countersunk and ground smooth on the interior.

Within the holder is the structural steel piston to the perimeter of which is attached a flexible seal ring that confines the gas to the space below. When the piston is at rest on the landing blocks, its entire weight is supported at the perimeter, thus eliminating the necessity for providing a foundation for the interior area of the holder other than to support the bottom plating and gas pressure.

The piston is a segment of a sphere designed as a self-supporting arch made up of radial and circular channels except at the outer circumference, where a ring of 24-in., 93-lb. sections reinforced with a ¾ by 21-in. plate riveted to the web, is utilized to resist the high stresses. This structural steel frame is covered with $\frac{5}{16}$-in. plates riveted to all radial and circular channels.

The piston is guided in its travel up and down the shell of the tank by an upper and lower set of laminated wood rollers 9½ in. in diameter, 18 in. long, and spaced about 4 ft. on centres. Both sets of rollers, which are about 25 ft. apart vertically, are located above the piston and are accessible at all times. The lower set of rollers is located immediately above the piston or packing ring, the upper set being attached to the horizontal girder at the top of the structural bracing, which extends from the piston deck. This girder also serves as a balcony or walk when lubricating the bearings of the rollers.

The exterior of the Syracuse holder is provided with a stair and an electric elevator. Access to the piston is provided by means of an electrically operated lift suspended from the dome in the centre of the roof, and in addition by a double-chain folding ladder.

* From the "Gas Age-Record," April 16, 1932.

City and Guilds of London Institute

The following questions were set in the City and Guilds of London Institute 1932 Examinations in the subjects named:

MINOR COURSE IN GAS-WORKS PRACTICE.

Tuesday, April 26, 7 to 10 p.m.

(Not more than six questions to be attempted. Sketches may be adopted to obviate long and involved statements. The maximum number of marks obtainable is the same for each question.)

1. (*a*) Describe the principal primary products obtained from the carbonization of coal.
   (*b*) Give the approximate weight of each per ton of any coal with which you are familiar.
2. (*a*) Draw a cross section through the mouthpiece, ascension pipe, dip pipe, and hydraulic main of a horizontal retort setting.
   (*b*) Describe how the various parts are jointed together and how the mouthpiece cover (lid) is made gas tight.
3. (*a*) Draw a simple cross section through a carburetted water gas plant with waste-heat boiler attached.
   (*b*) Describe generally what takes place, in each of the main sections, during the blowing and gas making periods respectively.
4. (*a*) Discuss the relative merits of air and water-cooled condensers.
   (*b*) Describe an example of either type, with sketch.
5. (*a*) Describe shortly and give a sketch of the construction of one form of steam boiler.
   (*b*) Enumerate the principal fittings and their use.
6. (*a*) The maximum pressure gas in a two-lift gasholder 100 ft. in diameter is 6 in.; what is the aggregate weight of the two lifts?
   (*b*) Describe how the lifts are guided and sealed in either a frame or a spirally guided holder.
7. (*a*) Describe one type of station meter.
   (*b*) Explain what is meant by correcting the volume registered to normal temperature and pressure.
8. (*a*) Describe the apparatus used for sampling and testing the waste flue gases from a retort setting.
   (*b*) Give the approximate analysis of what you would regard as a satisfactory sample.

MINOR COURSE IN GAS SUPPLY PRACTICE.

Tuesday, April 26, 7 to 10 p.m.

(The maximum number of marks obtainable is affixed to each question. Not more than six questions to be attempted.)

1. What part does a gasholder play in furnishing the initial gas pressure to the district? (*30 marks.*)
2. Describe fully how you would test for a leakage in a gas main. If the main was found to be cracked at a socket, what procedure would you adopt in repairing the damage? (*30.*)
3. What is meant by "unaccounted-for" gas? Explain the chief reasons for "unaccounted-for" gas. (*20.*)
4. Give an outline sketch of an ordinary dry gas meter with inlet and outlet connections as fixed in a consumer's premises. (*30.*)
5. Sketch in plan the hotplate of a modern gas cooker having three boiling burners and a griller. Give reasons for present-day design of hotplate bars. (*30.*)
6. What use is being made of reflectors in street lighting? (*20.*)
7. Sketch in simple outline any type of non-condensing radiator. What class of heat would such an appliance chiefly give? (*20.*)
8. Give a description of any sealed type of geyser with which you are familiar. What precautions are necessary in fixing such a geyser? (*20.*)

GAS FITTING.

Grade I.

Monday, April 25, 7 to 10 p.m.

(Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.)

1. Sketch any form of lighting burner with which you are familiar and name the various parts. State its approximate candle-power and gas consumption, assuming that gas of a calorific value of 500 B.Th.U. is used.
2. What is meant by "gas pressure" and how is it measured? Describe briefly any form of gauge. Illustrate your answer with a sketch.
3. What tools and materials would you require,
   (*a*) to make a $\frac{3}{4}$-in. lead to lead joint,
   (*b*) to cut out and insert a tee in a length of $\frac{3}{4}$-in. piping (barrel),
   (*c*) to fix a 5-light meter shelf to a lath-and-plaster wall?
4. The internal dimensions of a hot water cylinder are 36 in. high by 20 in. diameter. How many gallons of water would this hold, and what would be the weight of the water?
5. (*a*) Read the following meter index: [Not reproduced here.]
   (*b*) What is a British Thermal Unit?
   (*c*) What is a Therm?
   (*d*) Convert 5000 c.ft. of gas (500 C.V.) to therms.
6. What is the difference between seamed and solid drawn brass tube? Which should be used for making gas pendants and brackets, and why?
7. You are given a piece of steel 10 in. long by $\frac{7}{8}$ in. diameter suitable for making a chisel for cutting through brick walls. (*a*) Describe fully how you would make the chisel and how you would harden and temper it. (*b*) Give a sketch showing the shape you would make it.
8. In what circumstances would you require the use of the following tools:
   (*a*) Ratchet stocks and dies.
   (*b*) Auger.
   (*c*) Bent-bolt.
   (*d*) Lead dresser.
   (*e*) Bobbins and followers.
   (*f*) Bell bit (sometimes called a ball gimlet).
9. Fig. 1 shows the incorrect method of fixing a pendant to a compo supply. Make a sketch showing the correct method.

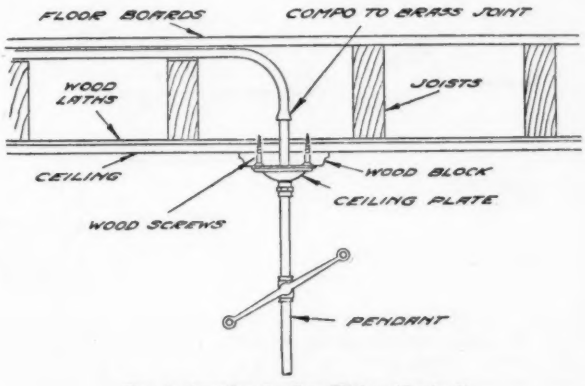


Fig. 1, Question 9.—Gas Fitting (Grade 1).

Grade II.—Written Paper.

Monday, April 25, 7 to 10 p.m.

(Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.)

1. (*a*) What pressure loss would you expect through a meter when working to its rated capacity?
   (*b*) How would you test a meter for pressure loss?
2. Sketch any form of street lantern with which you are familiar, showing the method of fixing it to a vertical column, the air inlet, and the provision for torch lighting.
3. You are sent to investigate a complaint; on arrival you find that a gas fire which is alight appears to be burning satisfactorily, but on lighting up the cooker it is noticed that there is insufficient gas. How would you proceed to locate the trouble and what steps would you take to remedy it?
4. You have been asked to fix a hot water tank measuring 2 ft. 3 in. wide by 1 ft. 9 in. front to back by 1 ft. 6 in. deep (internal dimensions) to a 9-in. brick wall, the other side of which must not be touched in any way. Give the weight of the contents of the tank and show how you would support it on the wall. State the materials that you would use, giving sizes.
5. What are the common defects met with in gas lighting burners, gas fires, and cookers? State how you would remedy them.
6. Convert to inches water gauge the following: (*a*) 2 in. of mercury, (*b*) 4 lbs. per sq. in. Sketch a 6-in. U-gauge showing a pressure of $1\frac{1}{2}$ lb. per sq. in.
7. Sketch and describe methods of fixing a 5-light meter (*a*) when the service and supply run vertically above the meter, (*b*) when the service and supply run vertically below the meter, (*c*) when the service and supply run horizontally, with a slight fall to the meter. Show all meter connections and state sizes. What causes the defect known as "leaky index"?
8. What system of water heating would you recommend for a flat having a bath, lavatory basin, and kitchen sink? One bath only will be required each morning. Sketch the heater in outline and show all connections, giving sizes.
9. (*a*) Give a brief description of the method of fixing a 5-light cluster type of lamp to a 9-in. brick wall. The centre of the lamp must be 3 ft. 6 in. out from the wall and the supply may be run on either side of the wall. Give a dimensional sketch showing the lamp arm and how you would fix it.
   (*b*) Give a sketch showing the method of fixing a bracket to a point on the face of a wall, showing the fittings required.

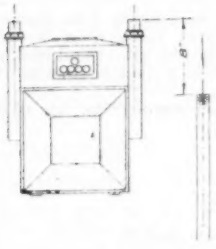
Grade II.—Practical Examination.

Saturday, April 23, 2.30 to 6.30 p.m.

(Candidates must attempt all questions.)

1. With the materials provided, make up a suitable connection for the outlet of the meter shown in fig. 1 on the attached plate, with the necessary joints. (*$1\frac{1}{4}$ hours; 60 marks.*)

2. With the material provided, make up a ¼-in. barrel bracket supply to meet the conditions shown in fig. 2 on the attached plate, leaving a ¼-in. equal tee 2 ft. up from floor level. Indicate to the Examiner where you would run your supply and state how you would make the connection to the ¾-in. barrel



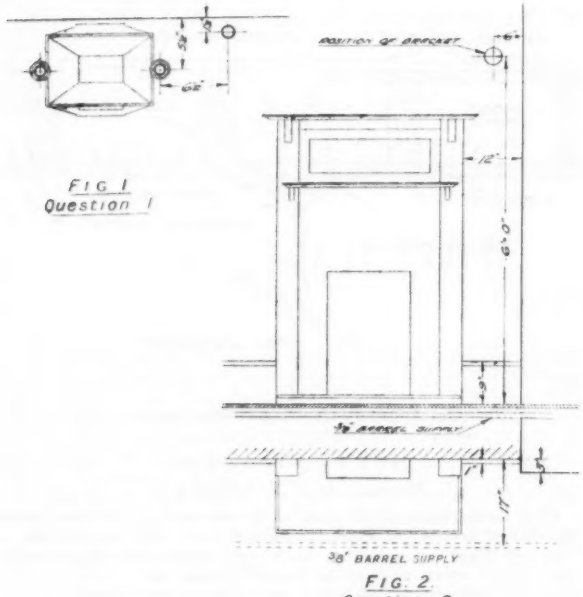


FIG 1
Question 1

FIG. 2
Question 2.

supply under the floor. Test with a pressure gauge for soundness. (*1½ hours; 50 marks.*)

3. Dismantle and reassemble the 3-light cluster-burner lamp and answer the questions put to you by the Examiner. (*½ hour; 30 marks.*)

4. Fit up the cooker completely and adjust all burners ready for use. State the approximate consumption per hour of each burner. (*½ hour; 30 marks.*)

5. Dismantle and reassemble the gas fire. Test it and leave in working order. Answer the questions put to you by the Examiner. (*½ hour; 30 marks.*)

Grade II.—Viva Voce Examination.

Saturday, April 23, 10.30 a.m. to 1 p.m.

(*The maximum number of marks that may be awarded is given in brackets after each question.*)

1. Read the various indices set by the Examiner, assume that these represent quarterly meter readings, and say how much gas was consumed in each quarter. (*20 marks.*)
2. After fixing a gas fire, what tests would you apply in order to ascertain whether the job was satisfactory? (*20.*)
3. Why is a baffler fitted on a geyser flue pipe, and where is the best position for it? (*20.*)
4. A carcass, after being tested, is found to be leaky. How would you proceed to locate the leak, if no gas were available? (*20.*)
5. How does a " sealed " type geyser differ from an " open " type? (*20.*)

Final Examination.—Written Paper.

Monday, April 25, 7 to 10 p.m.

(*Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.*)

1. You have been requested to run the necessary gas supplies and fix a 1-light lamp on the ground, first, second, and third-floor landings of a block of flats. The four lamps are to be automatically lighted at 6.0 p.m. and extinguished at 11.30 p.m. each day. State how you would carry out the job, giving a sketch to illustrate your answer.
2. When a water heater is in use, you find that a cooking stove is getting insufficient gas. On taking pressures at the cooker you find that when the water heater is out of use and the cooker has all burners alight, the gas pressure is 40-tenths water gauge. When the water heater and cooker are both alight the pressure is 22-tenths water gauge. Assuming that there is no stoppage, and that it is not possible to install a larger supply, how would you get over the difficulty?
3. (*a*) Sketch a complete coke-heated tank system, giving the sizes of all pipes, tanks, and connections for one bath, kitchen sink, and lavatory basin.
   (*b*) Give a sketch showing how you would fix a gas-fired storage water heater in conjunction with a coke-fired water heater. It is understood that coke fuel will be used during the winter and gas during the summer.
4. How would you fix a 200-light meter 10 ft. up from ground level on a wall 14 in. thick? Give a list of the material required, with sizes; also state what procedure you would follow to remove the air from the meter.

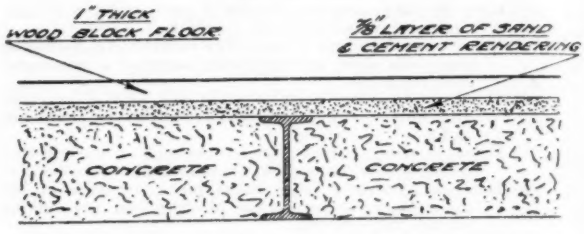


Fig. 1.

Gas Fitting (Final Examination—Written Paper).

5. Fig. 1 shows the section of a steel joist and concrete floor. After investigation, you find that the only possible " run " is across the steel joist. The size of the supply is to be 1½-in. barrel (the outside diameter being approximately 1¾ in.). The rendering and laying of the wood blocks will be completed after your job is finished. It may be assumed that the architect has agreed to a pipe chase being cut in the concrete. Sketch a copy of the drawing indicating how you would carry out the job.
6. How would you carry out the following work and what tools and material would you require:
   (*a*) Repairing a leaky rivet in a hot-water cylinder.
   (*b*) Cutting a hole in a ¼-in. plate tank to take ¾-in. barrel and making water-tight connections.
   (*c*) Drilling and tapping a hole to take a ¼-in. Whitworth screw. (Give the size of the drill that you would use.)
   (*d*) After fitting a gas-heated hot-water installation you find there is an " air lock." How would you proceed to remove it?
7. A consumer complains of a strong smell of gas in the basement of his house, and upon examination you find a crack in the brass main cock. The service is close to the wall and badly corroded. How would you deal with this job?
8. What are the chief points to be observed when fixing (*a*) a geyser, (*b*) a circulating water heater, (*c*) a multi-point geyser? Give a sketch of the flue equipment for a circulating water heater and state what material you would recommend for the flue if it were necessary to extend it 20 ft. up on the outside of the wall.
9. Fig. 2 shows the section of an apparatus used in connection with the supply of gas. State what it is, which is the outlet, and how it operates. In what circumstances would you use one, and how would you set it?

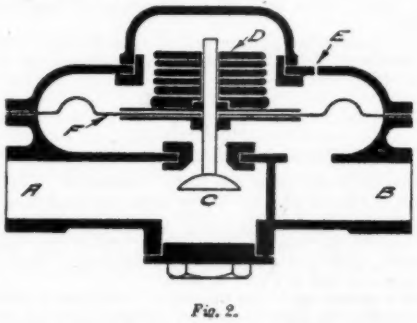


Fig. 2.

Gas Fitting (Final Examination—Written Paper).

Final Examination—Practical Tests.

Saturday, April 23, 2.30 p.m. to 6.30 p.m.

(*Candidates must attempt all questions.*)

1. With the material provided, make up a suitable connection for the outlet of a meter as shown in fig. 1, complete with joints, and with a ¾-in. saddle joint in any convenient position. (*1¼ hours; 60 marks.*)
2. With the material provided, make the set shown in fig. 2. Test with a pressure gauge for soundness on completion. (*1½ hours; 50 marks.*)

3. Dismantle and re-assemble the geyser, and answer the questions asked by the Examiner. (*½ hour; 30 marks.*)
4. With the length of ½-in. brass tube provided, make the set shown in fig. 3, and put a thread on each end of the tube. (*¾ hour; 40 marks.*)
5. Fix the portable recorder with rubber connection to the point provided, and set ready for use. Answer the questions put to you by the Examiner. (*¼ hour; 20 marks.*)

FINAL GRADE.—VIVA VOCE EXAMINATION.

Saturday, April 23, 10.30 a.m. to 1 p.m.

(*The maximum number of marks that may be awarded is given in brackets after each question.*)

1. Examine the valve shown to you by the Examiner. Explain how it operates, and answer the questions asked you by the Examiner. (*20 marks.*)
2. When running a condensation pipe from a geyser to the bath waste which side of the "trap" should you make your connection, and why? Answer the further questions put to you by the Examiner. (*20.*)

3. Examine the cooker and answer the following questions:
   (*a*) What is the approximate consumption per hour of each burner on the hot plate and in the oven?
   (*b*) How would you examine the oven for what is known as "smother" and what would you do to remedy the trouble. (*20.*)

4. What test would you apply to a gas fire to ascertain whether the products of combustion were passing into the flue? If you found the chimney was "sluggish," what would you recommend? (*20.*)
5. Examine the 120 high-capacity meter and explain its working to the Examiner. (*20.*)

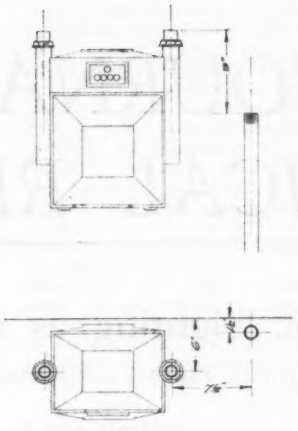


FIG. 1.
Question 1.

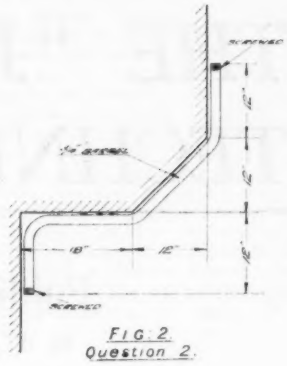


FIG. 2
Question 2.

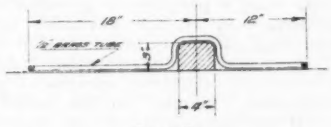


FIG. 3.
Question 4.

REVIEWS

THE ANALYSIS OF FUEL, GAS, WATER, AND LUBRICANTS.*

Reviewed by H. M. SPIERS, M.A., B.Sc., F.I.C.

The welcome with which one receives the fourth edition of this well-known manual is accompanied by a sense of deep regret that its brilliant author is now no longer with us. His sister, who had been given a thorough outline of his ideas in connection with the revision of the work, has carried out her loving task in an admirable manner and has provided what can only be regarded as a very appropriate tribute to his memory. An appreciation by Horace Porter of Professor Parr's contributions to fuel technology appears as a foreword.

The title does not truly represent the scope of the book, since rather more than one-half of the space is devoted to general matters which, though not of essential importance in connection with analytical work, are nevertheless subjects which the analyst who is interested in his work will certainly find of considerable interest. This section of the book is entitled "Lectures," and the analytical processes are described in the final section, "Laboratory Methods."

The Lectures are written in inimitable style and cover a wide range of themes, the treatment being both historical and technical. A very readable account is given of the development of fuel research in America from the earliest times and of the rapid progress which has been made in the exploitation of the fuel resources of the United States. Professor Parr's own work has ranged over many subjects of fundamental importance, such as the classification of coal, calorimetry, the determination of the various forms in which sulphur is present in coal, the storage, oxidation, and spontaneous combustion of coal, and low-temperature carbonization. His method of correcting analytical results to a pure coal basis and his conception of the pure coal substance as "Unit Coal" have not yet come into universal use though they undoubtedly merit serious consideration. He was, also, the first to draw attention to the caustic embrittlement which can occur in boilers if the ratio of alkali sulphates to carbonates in the boiler water is not kept at a sufficiently high level. These subjects are among those discussed and a further useful section is one devoted to coal purchasing contracts and their formulation.

The analytical section deals with the more usual determinations which are needed in connection with the analysis and testing of coal and coke, manufactured gas and flue gas, boiler feed water, boiler water, and lubricants. The details given are in all cases precise and fully adequate and are accompanied by illustrations when necessary.

A short method is described for the ultimate analysis of coal and is based on the analysis of the melt obtained when the coal is oxidized by means of sodium peroxide as in the determination of the calorific value or sulphur content. The carbon content is obtained by estimation of the carbon dioxide liberated from the melt by treatment with acid, and from a knowledge of this and of the calorific value, ash content, and sulphur content, the hydrogen content and oxygen content may be calculated on the assumption that the nitrogen content may be regarded as a constant.

In connection with flue-gas analysis, a description is also given of the calculation of efficiencies and heat losses.

The aim, throughout, has been to indicate the close alliance between scientific investigation and technology. The book has been written by an experienced teacher thoroughly familiar with every aspect of his subject, and will prove stimulating and of real use.

* By Prof. S. W. Parr. 4th Edition [International Chemical Series]. New York and London, 1932, McGraw-Hill Publishing Company, Ltd. Pp. XVI. + 372; price 18s. net.

INVESTIGATION AND EVALUATION OF SOLID FUELS.*

The aim of the author has been to give an account of the methods which must be applied in the examination of solid fuels, particularly when it is desired to obtain information which will enable the fuel to be employed in the most appropriate manner with due regard to the sum total of the properties of the fuel, or, in other words, to enable a decision to be made as to whether a particular fuel is suitable or unsuitable for steam raising purposes, low-temperature carbonization, complete gasification, or other uses. To this end, a description is given of the analytical methods involved in the testing of coal and of assay tests at low and high temperatures. An account is also given of the method of determining Wieluch's coalification index and of a laboratory method of studying the effect of cracking on the volatile products of carbonization. Several of the methods described were devised by the author.

The assay tests enable a heat and mass balance to be obtained for the carbonization products, and this, combined with the other analytical data, the physical and coking properties of the coal, and the fusion point of the ash, provides sufficient information to render possible the drawing up of a considered report on the utility of the fuel for any specific purpose or process. The methods involved in the interpretation of the results are illustrated by means of two examples covering a lignite and a coal. The coal selected for this purpose was a Japanese one of rather exceptional nature, the yield of gaseous therms in the assay test at 1000° C. being very low and the tar yield very high. The composition of the gas, also, is not such as would have been expected as a result of carbonization of the coal at the temperature in question.

The work appears posthumously, for the author died at a comparatively early age at the height of a brilliant career while the book was in the press. It contains a great deal of useful information and should repay close study.

* "Die Untersuchung der Brennstoffe und ihre Rechnerische Auswertung." By Prof. M. Dolch. [Halle (Saale), 1932, Wilhelm Knapp. Pp. XVI. + 236. Price RM. 18.50 unbound, RM. 19.80 bound.]

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Public Lighting as a Measure of Safety*

By H. DAVIES, Engineer and Manager to the Chesterfield Gas Department.

Recent studies of statistics on street accidents seem to furnish indications of certain tendencies, which must be viewed with concern. During recent years, as is well known, there has been a progressive increase in the total number of accidents—an almost inevitable result of the continually increasing volume of motor traffic and the constant speeding up—which even energetic "safety first" methods have been only partially successful in checking. There is, unfortunately, ground for the belief that roads tend to become, if anything, less safe for users as a whole. It is true that records for 1931 seem to show a slight diminution in the total number of accidents as compared with the previous year. But an analysis recently made by the Pedestrians Association reveals the singular fact that, whereas accidents to motor cyclists and motorists show a material diminution, the number of accidents to pedestrians has increased. (This is of interest because one may infer that the prevalence of this class of accident is particularly likely to be increased by poor lighting.)

A second tendency is for the proportion of accidents occurring at night to become greater.

It has been pointed out that since the termination of the war approximately one and a half million people have been killed or injured in road accidents in Great Britain—a number equal to more than half the British casualties in the Great War. Now present methods of assembling official statistics on street accidents usually do not enable one to distinguish between those occurring by night and by day. It is therefore only from special inquiries that we are able to estimate the part played by good public lighting in reducing the danger of accidents. But there is every reason to believe that this part is already a vital one, and is constantly assuming greater importance.

This consideration alone justifies the general belief of public lighting engineers that economy in street lighting, even during the present period of industrial depression, is inadvisable if it results in any diminution of efficiency. It should be remembered that in almost every other field of lighting the general standard of illumination is very much higher than that prevailing before the war. In our streets, where traffic conditions have been revolutionized, there is every reason to desire a similar advance. Many individual examples of improvements in street lighting could doubtless be mentioned. Yet it may be doubted whether the standard, in many cases, is, even now, materially higher than it was twenty years ago—and this even applies to some thoroughfares which have changed their character completely, becoming avenues of traffic instead of purely residential roads.

It is rather singular that of late the original main function of street lighting—prevention of crime—has been again coming into prominence. In recent letters to the Press it has been pointed out that assaults and robberies seem to occur most frequently in streets and squares rather off the main thoroughfares and relatively poorly lighted. Some years ago an interesting investigation in Berlin showed that burglaries tend to follow a seasonal course—being most frequent in the dark winter months and less in summer. A diagram relating number of burglaries to months of the year followed very closely the standard curve of intensity of daylight—a result exactly similar to that reported in connection with seasonal variations in the industrial accident rate.

While the advantages of good public lighting and well designed illuminated traffic signals and notices in the interests of safety are now generally recognized, it is still by no means easy to obtain detailed statistics showing their beneficial effect. It is our hope that the National Safety First Association may be able to assist us in getting fuller data, but in the meantime reference may be made to the experiences of some of our members and of chief constables in various cities. In the paper presented at the 1930 Congress Mr. R. Beveridge alluded to indications obtained even then of a progressive diminution of street accidents in Edinburgh, a surprising and gratifying result in view of the general experience in most other cities. Fuller records were recently presented in a Memorandum issued by the Chief Constable in February, 1932, from which I am allowed to quote the following record of street accidents:

Year.	Number of Accidents.
1926	1801
1927	1336
1928	1089
1929	1038
1930	996
1931	937

The number of accidents is thus apparently only about half that recorded in 1926, when the Traffic Department was inaugurated in Edinburgh. The report also contains a list of ten methods which have contributed to this reduction. One half of these measures is definitely associated with public lighting.

The Chief Constable of the City of Sheffield has likewise recorded his belief that in the circumstances associated with modern traffic conditions the safety of the general public, both pedestrian and vehicle using, tends to be secured by the presence of efficient street illumination, which also plays an important part in traffic control and the preservation of order.

Another of our members, Mr. I. H. Massey, Superintendent of Public Lighting in Oldham, quotes an interesting experience during a period when a percentage of the main road lighting was temporarily reduced. This proved so inconvenient to police officers in their work of regulating the traffic that at the first opportunity the lighting was increased to its former level. Mr. Massey also refers to a census of accidents carried out during lighting hours in Oldham on several of the main roads throughout the past three years. Taking into consideration length of roadway studied and number of acidents recorded it is possible to infer the approximate "traffic-risk" during lighting hours and compare this with the relative number of accidents reported in the two cases. It was found that, for a given traffic-risk, the number of accidents was, generally speaking, least in those streets falling in the higher class of lighting (according to the British Standard Specification).

STANDARDS OF ILLUMINATION.

Let us turn next to some of the problems involved in public lighting, which affect the safety and convenience of the public. It should at the outset be understood that, with the exception of lighting in coal mines (where operators depend entirely on portable lamps of low power), there is probably no field of lighting where performance lags so far behind our desires as in the case of our streets. The British Standard Specification divides streets into eight classes which are allotted minimum illuminations varying from 0·01 (Class "H") up to 2 foot-candles (Class "A"). Streets lighted in accordance with the "A" standard are at present so rare as to be almost non-existent, and even streets of the second Class "B" (1 foot-candle) are regarded as quite exceptionally well lighted and far from numerous. Yet this "B" illumination is about 1-20th of that now considered necessary for fine industrial work and is actually 1-500th of the average unrestricted daylight illumination out of doors. The lowest class "H" receives only an illumination of the same order as moonlight—approximately 1-50,000th of the normal daylight illumination mentioned above.

It will be understood, therefore, that when public lighting

* From a paper compiled by various members of the Association of Public Lighting Engineers, and submitted by Mr. H. Davies at the National Safety Congress, May 5.

engineers insist on the importance of maintaining adequate street lighting according to present standards they are moderate in their demands. The guidance of the rapidly moving and congested traffic that throngs the streets of a great city is a complex and highly skilled process—yet it has to be undertaken in a species of twilight, far below the illuminations customary in interiors of all kinds.

Effect of Road Surface.

Street lighting, however, is subject to other inherent difficulties. From motives of economy light sources are spaced relatively far apart. Consequently objects on the roadway are illuminated only by isolated and distant sources, so that their outlines rather than their shapes can be seen. Moreover, the modern dark coloured road surface, polished by the wheels of motor-vehicles, reflects little light and is an exceedingly difficult one to illuminate, with the result that we do not get the full benefit even of the relatively feeble illuminations furnished. There are also limitations to the positions of street lamps which must be selected according to the nature of the road. In narrow thoroughfares the advantages of central suspension of lamps on wires spanning the roadway are recognized, and in the case of boulevards lined by trees (the Victoria Embankment is a familiar example) it becomes essential to mount the lamps over the centre of the roadway. In the case of very wide thoroughfares, however, other methods become necessary. Whatever the method adopted a dominant consideration is the elimination of abrupt contrasts, in brightness and shadow—such as have not infrequently been referred to as dangerous in connection with the proceedings at coroner's inquests. With the present spacing of lamps considerable variations in illumination are almost inevitable. All we can do is to ensure that the change takes place gradually, and that there are no abrupt transitions from brightness to obscurity. But here again the nature of the road-surface comes in. The apparent brightness of the roadway may depend on direct reflections of lamps in its highly polished surface, rather than the actual illumination it receives. " Splashes of light " caused by such reflections are frequently confusing, and are liable to give the impression that the roadway is unevenly illuminated. This is yet another circumstance that has to be taken into consideration in fixing the positions of sources.

Inequalities of Treatment.

In addition to the provision of moderately uniform illumination in any one street, the sudden contrasts in brightness that are apt to occur when one passes from a main street to a side street, or *vice versa*, deserve consideration. The fact that such contrasts do occur, and that they exercise a distracting effect on drivers, should not be interpreted to mean that the illumination of main roads is excessive, but rather that at present side roads are apt to receive insufficient light. When the lighting of a main thoroughfare is improved, therefore, the needs of adjacent side streets should not be forgotten. If the illumination throughout their length cannot be brought up to a reasonable proportion of that in the main street, it should at least be possible to make the transition gradual by accentuating the illumination somewhat as the main thoroughfare is approached.

Similar contrasts are apt to occur when a road passes through the areas of different local authorities, who may furnish widely different intensities of light and may even employ dissimilar methods. The application of the British Standard Specification should do something to eliminate contrasts of this character, but their existence is recognized and forms one argument in favour of some form of central supervising authority for public lighting.

Meantime the peculiar location of boundaries often causes undesirable and even dangerous contrasts—*e.g.*, when the boundary terminates at important cross roads and the motorist passes from the good lighting of a city into comparative darkness. In other cases the boundary may run for a considerable distance along one side of a road, and a complete lighting scheme is impossible without co-operation between the two authorities. Such anomalies could be lessened by more effective concerted action between local and county authorities, the system being operated by the lighting engineer of the larger authority.

Avoidance of Glare.

Public lighting engineers, needless to say, are well aware of the drawback of " glare " or dazzle from unduly bright sources of light. Much care has been devoted to the design of lanterns which diffuse the light and direct it scientifically over the roadway, but with the present wide spacing of lamps some degree of glare is almost inevitable if moderately even illumination on the roadway is to be attained. The use of opaque reflectors with a sharp " angle of cut-off " so as to screen the lamps from view has been suggested, but it is evident this method, if pursued to a logical conclusion, would be apt to give rise to patchy illumination, besides darkening to an undesirable extent the faces of buildings lining the street. Moreover, complete masking of the light source, besides being unsightly, would be unpopular with motor-drivers who derive some guidance from the row of visible lights at the side of the roadway. The last consideration suggests yet another factor determining the positions of light-sources—the necessity of avoiding any form of spacing liable to mislead drivers as to the course of a distant section of the road. On the whole present opinion favours the use of visible light sources of mild brightness, mounted at the desirable minimum heights above the roadway, so that only distant lights come within the direct range of view. Useful guidance in this respect is afforded in the tables of mounting heights included in the most recent edition of the British Standard Specification for Street Lighting. The adoption of the minimum height of 13 ft. for roads of the lowest classes (" C " and " H ") has proved particularly useful.

Value of Contrasts.

The mere provision of a certain amount of light, however, is only part of the process of rendering objects in the street readily visible. Any object that has exactly the same colour and reflecting power as its background tends to become invisible, even in relatively bright illumination. In view of the meagre amount of light at present available in many streets it becomes all the more necessary to make use of contrasts. It has already been explained how the dark surfaces of roadways tend to make persons wearing ordinary clothing inconspicuous. Experiments in Leicester and other cities have led to the conclusion that it is a great advantage for officers on point duty to wear white coats or at any rate white helmets and gauntlets. The provision of special " spotlights " affording strong local illumination at busy crossings also serves to enable the figures of officers on duty to be clearly seen. In cases where the area is already fairly strongly illuminated the projection of an amber beam on to the figure of the pointsman is a useful device. A centrally suspended fitting, giving intensive lighting at crossroads, also acts as a useful deterrent to careless motorists. The value lies not merely in the increased visibility, but in the emphasis thus given to the importance of the crossing—which leads the driver unconsciously to exercise caution. At particularly busy and dangerous crossings a central pillar terminating in a ruby lamp acts as a most valuable safeguard.

On country roads, where the lighting is at best feeble and where, owing to the relatively small amount of traffic, high speeds are usual, practical means of rendering the distant figures of a pedestrian more visible would be welcome. If the carrying of lights by pedestrians is dismissed as an absurdity, the use of some white badge, or reflecting disc similar to that used by cyclists, at the back does not seem such an unreasonable precaution. There are other ways in which contrasts may operate in the interests of safety. The white traffic-guidance lines, originally regarded as faddy, have now proved their value on all busy routes. Would it not be possible, at least in dangerous areas, for the kerb or extremity of the footpath to be also distinguished by a white coating? Stepping from the footpath on to the roadway is not only due to absence of mind; in a feeble illumination the edge of the footpath is often extremely indistinct. A white division line along the kerb would also be of considerable aid to motorists by indicating the course of the road some distance ahead and giving early warning of curves and corners.

There are many other points of procedure that have a bearing on safety. On a windy night the swinging of loosely suspended lamps (especially those of a highly directive character giving a concentrated beam) is liable to cause disconcerting shadows on the roadway or to give the impression of something moving across the road. Good rigid suspension is therefore expedient, even if it should be found (as is not necessarily the case) that the average life of filaments or mantles was lessened slightly as a result. Lamps partially screened by the foliage of trees, which sway in the wind, may give rise to the same effect. In any case the dense shadows caused by intervening foliage are obviously undesirable. The remedy is to bring the lamps well out into the middle of the roadway whenever there are trees planted at the side.

Importance of Maintenance.

One other question of evident importance in relation to safety is that of maintenance of lighting systems. It has occasionally happened that when a fatal accident occurs a lamp in the vicinity is reported to be out of order, and it is evident that in certain cases the failure of a street lamp may prove highly dangerous. The maintenance system should therefore be the subject of careful study. One difficulty is that unexpected failures of lamps may occur during

lighting hours, when inspectors are not ordinarily on duty. It is possible, indeed, for a lighting department to have a really admirable maintenance system during the day, which nevertheless fails during the lighting period. Provision should always be made for failures to be reported to a specified official after hours. In many cities the police help considerably by reporting failures at all hours of the night. Arrangements should be made for certain fitters to be available throughout the night and any failures in recognized danger-spots should be at once remedied.

Conclusion.

I may perhaps conclude by giving expression to the general desire among our members for closer relations with the National Safety First Association in connection with matters relating to public lighting. We do feel that adequate public lighting is one of the strongest possible influences in promoting street safety—not merely in helping to lessen the dangers of accidents but by enhancing personal safety and the security of property.

Yet progress is not nearly so rapid as one could desire. While in the case of most other forms of lighting there is the incentive of commercial return to encourage progress, in the case of public lighting the benefits are so widespread that they are apt to receive insufficient recognition by the individual citizen. Authorities, in such times as the present, are naturally disposed to economy and apprehensive of additions to the rates. In the long run, therefore, it is to the influence of enlightened public opinion that we must look for aid in bringing about much needed improvements.

What is chiefly needed in order to carry conviction is reliable statistical information illustrating the benefits of good public lighting in promoting public convenience and security. The form in which records of street accidents are usually presented offers little opportunity of drawing conclusions in regard to the part played by lighting. We have still fewer records showing in detail how better public lighting or the use of luminous traffic control signals has facilitated the speed and volume of traffic passed.

May I appeal to the National Safety-First Association to aid us in collecting information of this character, and in executing improvements in lighting where these are shown to be necessary? Close contact between public lighting engineers and local representatives of your Association should help in this respect. The growing complexity of the problems involved in the use of light in our streets and on our roadways, whether in the form of public lamps, luminous traffic signals, or illuminated signs, affords support to our belief that in every city or town of any size there should be a fully qualified expert in independent charge of public lighting. In many cities this is already the case and in others there will now almost invariably be found someone who is directly responsible for public lighting equipment. In most large cities there are also Local Committees of your Association. It would, we believe, be materially in the interests of both bodies if it were recognized that the public lighting engineer (or equivalent official) should as a matter of practice be invited to act on the Local Safety-First Committee. It is suggested for your consideration that a recommendation from the National Committee to Local Committees should be made to this effect.

In conclusion, I desire to acknowledge the help rendered by various members of the Association of Public Lighting Engineers in the preparation of this paper, among whom I may mention specially, Mr. R. Beveridge, Mr. J. K. Brydges, Mr. J. F. Colquhoun, Mr. J. S. Dow, Mr. W. J. Jones, Mr. S. B. Langlands, Mr. I. H. Massey, and Mr. T. Wilkie.

Behaviour of Refractory Materials in Continuous Vertical Retorts*

By A. T. Green, F.Inst.P., A.I.C.

After pointing out how the systematic study of the conditions of retorts after their effective life may provide a source of valuable data, the author proceeds to discuss in turn various phenomena bearing on the question of durability of refractories in vertical retorts.

Initial Heating of the Retort Setting.

Any well-burned lime-bonded silica product (the "straight" silica product) may contain quartz, cristobalite, and tridymite, with a complex glassy matrix. A highly siliceous clay-bonded product (with over 92 p.ct. silica) contains quartz with some cristobalite and an elastic clayey matrix. The behaviour of these products in the preliminary heating of the setting and in subsequent usage is complicated owing to (1) the normal reversible expansion of the setting, (2) those reversible expansions occurring at certain low temperatures, and (3) an irreversible expansion due to residual quartz changing into cristobalite and tridymite at high temperatures. The first alone would present no practical difficulty, but the third may cause trouble during the life of the setting. The second type of reversible expansions, called inversions, involve very appreciable volume changes, the largest which may amount (at about 225° C.) to 3 p.ct. of the original volume (in the case of cristobalite only). At 575° C. quartz expands 1·3 p.ct., and at 117° C. tridymite expands slightly, and again at 163° C., its total expansion being less than 1 p.ct. These changes occur rapidly, sometimes instantaneously at the temperatures mentioned, so strains can readily be introduced into the refractory structure with weakening effect. Thus the initial heating of a setting must proceed very cautiously up to 650° or 700° C. The siliceous product is less liable to spalling owing to lower cristobalite content.

By the usual method of starting low fires in the producers the gases may gradually reach a temperature of about 400° C. in the flues and combustion chambers, and in this way the setting will adequately dry out and the difficulties of the low-temperature changes will be satisfactorily overcome. The method is capable of fair control by means of a base-metal thermo-couple or a special thermometer placed at the base of the producer-gas flue. When the required rate of temperature increase is no longer produced, gaseous firing must be proceeded with, and as temperature rises quickly at the start of this gaseous firing, very careful control is necessary, if the refractory construction material contains quartz in considerable amount, as the quartz expansion is appreciable, although much less than the cristobalite expansion.

In heating a setting, as much as 15 to 18 days may be required to reach 120° C. to ensure the driving off of the water. Too rapid production of steam in the cement might form cracks in the joints. To reach 400° C. may require 25 to 30 days. A "straight" silica setting expands 0·8 p.ct. linear (about 65 p.ct. of its total expansion) or 2 to 2·5 in. vertically when 400° C. has been reached. A siliceous product expands about 0·2 p.ct. (25 p.ct. of its total expansion) or about 0·6 in. vertically for the same temperature rise. The difficulty of keeping the temperature down with gaseous firing may cause the full period of initial heating to the carbonization temperature to occupy between 32 and 36 days.

Some experience is required to decide the amount and position of the expansion spaces. The modified refractoriness under load test with loads of 4 to 10 lbs. per sq. in. on the materials of construction gives very helpful expansion data—*e.g.*, by this test a "straight" silica brick shows expansion of 1·1 to 1·3 p.ct. when the temperature is raised to 1300° C., corresponding to an expansion of about 3 to 3·5 in. on a retort about 23 ft. high. Expansion spaces should be left as such. It is a mistaken idea to use a combustible filling material, because this material does not burn out before the major expansions have taken place, and so damaging strains may be produced in the setting.

Silica bricks containing over 30 p.ct. of residual quartz (specific gravity 2·42 or higher) are liable to cracking, because of the transformation of the quartz to the low specific gravity forms of silica, which transformation occurs at temperatures above 1200° C.—carbonizing temperatures.

A "straight" silica product with very high tridymite content is the most desirable, as having least tendency to spalling at low temperatures, and negligible "growth" of the material in practice, but material is difficult to get on a commercial scale, a high percentage of cristobalite being usually present in silica products. The specific gravity of a "straight" silica brick for carbonization duties should not exceed 2·36. Siliceous products under industrial condi-

* Abstract of a paper at the Spring Meeting of the Refractory Materials Section of the Ceramic Society, held at Folkestone from May 3 to 5, 1932.

tions do not tend to " grow " to the same extent, but mature to a hard vitrified material.

The cooling of retorts should be conducted carefully when intended to be put into operation again, or cracking may result.

Examination of Retorts.

Each retort of a setting shut down for repairs or reconstruction should be examined and the position noted.

Certain retorts using Durham coals of high coking value show bulging of walls of upper zones of retorts. Probably careful selection and grading of the coals would tend to overcome the trouble, but it is not always economical to do so. Flaking of the retorts about 10 to 12 ft. or so from the top of the retort may cause increase of cross-measurement, while the lower zones of the retort may become either wider or narrower (by erosion or slag adhesion) as the result of slag action.

The visual examination of the retort brickwork indicates (1) the amount of flaking and spalling, (2) the nature and amount of slag attack, (3) the behaviour of the cement in the joints, (4) the probable causes of any observed " holing," including failure of the cement joint followed by the spalling of the corners in the early stages of the working. The author states here that practically every case of " holing " investigated by him originated in the interior of the retort and *not* in the combustion chamber.

Influence of Slags and Slag-forming Substances on the Coking Surface.

Iron compounds, alkali, &c., pass from the coal to the surface and into the pores of the refractory wall of the retort, and according to temperature and atmosphere within the retort exert a superficial disintegrating action or a corrosive influence. Fusible silicates when formed tend to diffuse into the brickwork, and may cause " holing " and ultimate failure. Steam when present is an effective reducing agent which intensifies the action of iron slags. A comparatively fluid surface facilitates erosion at certain zones, and may also cause sticking of the charges, both usually in the lower half of the retort.

The foregoing was illustrated by reference to examination of a retort, in which, after a very short working time—during which two varieties of coal had been used—the descent of the charge seemed to be hampered by the " stickiness " of the retort surface at one zone, a condition resulting from accumulation of inorganic constituents of the charge on this surface. The initial trouble arose from the first coal, a very unusual type of lignite or brown coal. Analysis of the ash showed 37·7 p.ct. ferric oxide, with substantial percentages of lime, magnesia, and alkalis, and the iron was probably present in the ferrous state. Analyses of samples taken at intervals of about 2½ ft. from inside of retort, starting about 4 ft. from bottom, and calculations of amount and composition of extraneous slagging matter added to the surface are shown in a table. The table shows that (1) the amount of slagging material on the surface of the retort is greater at the bottom and decreases at the middle and lower zones, (2) alkalis, constituting more than half the added matter, form the major slagging constituent, though representing only 7·7 p.ct. of the coal ash, and (3) going up the retort the amounts of alumina, iron oxide, lime, and magnesia decrease, probably because their slagging propensities increase with temperature.

Four settings of retorts in different parts of the country, which worked serviceably for an efficient period, working on Durham coals, were investigated before and during dismantling. At gas-works 1 and 2 samples from the lower zones were taken from an individual retort in each setting. At gas-works 3 and 4 samples were taken from the lower zones of two retorts in the same bed. One of these retorts —in each of these beds—showed evidence of a conspicuous amount of slag attack, and some erosion had taken place; the other was only superficially attacked. Results of analyses are given in a table, showing composition of the original refractory in each of six retorts, and also of chippings from the coking faces and several layers of the retort walls. The main features of this table are as follows: (1) Penetration of the slagging constituents in samples A, B, C, and E, and the superficial effects on D and F, (2) in three out of the last four instances, the coking face chippings show an excess of " ferric " iron—perhaps the result of oxidizing effects during the initial period of cooling down of the retort, when the slag on surface is in a fluid state—(3) the concentration of " ferrous " iron is very definite, particularly in layers just behind the coking face, while the concentration of lime and alumina in these layers (2 to 4 p.ct. increase on the original material) suggests penetration of the slag by way of the matrix of the brick, and (4) the incrustation on the flue side probably results from the action of dusts in the producer gases.

Experience suggests that a comparatively small increase in the flue temperature increases the slag passage very considerably.

Under some conditions in the case of silica and highly siliceous products, the absorption of slag or dust rich in iron at high temperatures affects the softening point under load only to a relatively small extent.

The " holing " of retorts may be due either to slag erosion or to a gas leak through an opened joint. Evidence of erosion can be readily detected, often visually, generally by measurement. An opened joint may result from elimination of cement which is often followed by spalling of the corners of the refractory section.

Flaking and Spalling.

Flaking often occurs in a vertical retort about 6 to 12 ft. from the top. Particulars are given concerning two flaked portions of a retort made of silica firebrick, and also relating to flakes taken from four " straight " silica retorts. The analyses and other data indicate that the usage of the retort has caused (1) a very slight increase in the amount of iron, (2) an increase in the alkali content, and (3) a considerable decrease in the true specific gravity of the refractory.

The formation of scurf is discussed, and its bearing on flaking. The surface in contact with the scurf has probably been weakened at definite planes by (*a*) depositions and impregnations, (*b*) constitutional changes in the silica in the surface layers resulting from previous high-temperature scurfings, and (*c*) a general spalling tendency of a silica product. Flaking may be regarded as a particular type of spalling.

Spalling can be regarded as the failure of a refractory to withstand without disrupture those stresses induced by temperature fluctuations or thermal shock. Increased vitrification increases the spalling tendency, as also do interpenetration of dusts and crystallizing substances into the pores, and impregnations of slag-forming substances. In general, it may be said that continued usage influences the spalling tendency of the retort lining.

Joints and Jointing Cements.

Many retort troubles are reported to start at the joints. It is essential that joints be as thin as possible. To obtain such joints (1) the refractory section must be true to shape and (2) the cement must be uniformly finely ground and plastic. With silica cements plasticity can be obtained by the presence of a naturally-associated clay, the addition of an artificially admixed clay, or the addition of a plasticizer of the nature of cellulose liquor, glue, &c. Experience shows that excess of clay produces a contractile cement and may cause injury by affecting the relative positions of the retort sections and by tending to fuse into the refractory material, and that an artificial plasticizer like cellulose liquor burns out of the cement without inducing any tendency to vitrification, probably leaving the cement somewhat " powdery " and liable to be removed from the joints at an early period. The author considers a controlled amount of clay—say, 7 to 10 p.ct.—is no disadvantage, as it helps early vitrification without inducing undue contraction. A natural mixture of silica and clay as a basic raw material is desirable. No other vitrifying constituent should be allowed in the cement.

Conditioning of Hot and Cold Retorts.

During the period of " peak loading " difficulties may arise in the working of retorts. The necessity of assuring continuance of active service has evolved methods for the hotpatching of retorts. These methods are being studied, and are not discussed in the paper, but reference is made to the presence in certain cements, prepared for the purpose, of such questionable ingredients as sodium silicate, ground glass, and in one case 6 p.ct. of red lead. For high combustion-chamber temperatures the use of cements containing appreciable quantities of fusible constituents is dangerous.

All cold retorts should be re-conditioned before re-starting. Pointing and washing the surface with a silica cement, free from added fusible materials, are very valuable operations.

Conclusion.

Having regard to the zonal nature of certain troubles, the author considers it feasible to suppose that different types of refractories are required for the different zones. A new special type could be developed to resist flaking action better than a silica brick. The introduction of this new type over about 4 ft. of the retort length might cut down flaking to a minimum and reduce the necessity for hotpatching of the top zones. If such products increased the certainty of continued operation by 500 days, they would amply repay the extra cost. The zonal nature of vertical retort working also suggests that the constitution of a cement should vary with the zone of the retort.

Montevideo Gas and Dry Dock Company, Ltd.

The Sixtieth Ordinary General Meeting of the Montevideo Gas and Dry Dock Company, Ltd., was held on Wednesday, May 18, at the Offices of the Company, 321, Dashwood House, Old Broad Street, E.C.—Mr. FRANK H. JONES, M.Inst.C.E., Chairman of Directors, presiding.

The SECRETARY (Mr. Henry Kearns) having read the notice convening the meeting and also the report of the Auditors,

The CHAIRMAN said:

We have spent during the year £52,074 on capital account. This includes part of the cost of the new holder, further new plant, extension of mains, and additional meters and cookers, and we have written off for depreciation of plant and for cookers on hire £12,015, so that there is a net addition to capital expenditure of £40,059. This expenditure places us in a position to deal with an increase in business when the commercial depression in Montevideo disappears, but with any substantial improvement in sales, it will be necessary for us to provide further carbonizing plant.

There is a reduction of £22,568 in the value of the stock of general stores, but this is largely due to gasholder material in stock at Dec. 31, 1930, being included in the stock lists at that date, but used in the erection of the holder in 1931.

The sundry debtors at their par value amount to £56,385, but these have been written down to their exchange value on Dec. 31 of £36,750, a loss on this item alone of £19,635. I may add that the figure has been arrived at after providing for all debts considered bad and doubtful.

The cash in Montevideo at its par value amounted to £78,704, and has been reduced to the exchange value of 31½d. per dollar to £48,550, a loss of no less than £30,154. This money is urgently needed on this side, but owing to the rationalization of sterling for remittance to London, it is only coming over in small amounts which are quite inadequate to meet our accounts for coal and materials required to keep our works in operation.

On the debit side you will see that the 6 p.ct. debenture stock redemption account has been increased by £6187 to £30,375, against which the Trustees have investments which cost £13,581, and they have also bought for cancellation £16,590 of the 6 p.ct. stock.

As regards sundry creditors, those appertaining to Montevideo have been calculated at their exchange value. In the previous year, 1930, we included in sundry creditors the exchange reserve account of £22,500, but this amount has been taken out this year, and with an addition of £23,085 provided out of this year's profits increasing it to £45,585, has all been used as I before mentioned to write down our cash and floating assets in Montevideo to their exchange values on Dec. 31 last. If exchange improves, a portion of this large amount may come back into our accounts.

Owing to the prohibition of the Uruguayan Government regarding the payment of dividends, and to the low exchange—it fell at one time last year below 20d. per dollar—it was impossible to pay our usual interim dividend in December last, and it was a source of great regret to us that the regularity of half-yearly dividends since the year 1878 should thus be broken, and we have every sympathy with those stockholders to whom the loss of regular dividends has caused hardship.

As regards the purchase of goods, we had at one time to provide $12 to the £ instead of the normal $4.70, and you will readily see how this has so adversely affected our profits. Indeed, our profit on working of £131,960 at par is reduced by the loss actually suffered on remittances of £59,088 and a further £23,085 required from this year's profits to meet the loss on exchange on the floating assets to the net figure of £49,787; this, I think, will convey to you the seriousness of the exchange position.

It is not surprising, therefore, that we were forced to raise the price of gas from June 1 last, and the increased revenue from gas has only partly helped us to meet the exchange loss. Unfortunately, the higher price brought about economy in the use of gas, so that our record of substantially increased sales during the previous 13 years received a check, and we sold nearly 4½ p.ct. less gas. Because the rate of exchange had improved at the end of the year, and in the hope of arresting declining sales, we introduced a new tariff on Jan. 1, by which consumers are charged the higher price on the first 50 cub.m. consumed in a month, and all over that quantity is charged at the lower original price in force up to June of last year, and we hope by giving our consumers the advantage of the better exchange, that our sales will again advance, but this may take a little time. Certainly it has had the effect of arresting the decline; the number of consumers has increased during the first four months of this year, and the decrease in sales is less than the last four months of the year under review.

After meeting our fixed charges for debenture interest and redemption, taxes, and bad debts, which are double those of the previous year, and placing £2500 to general reserve, our profit would allow of a 3 p.ct. dividend, but until we are free to transfer our cash in Montevideo to London—the moratorium having been extended to the end of the current year—we shall not be in a position to pay one, but if and when we see our way to declare a dividend for the year, we shall call a meeting of the stockholders to confirm it.

The CHAIRMAN then moved the resolution for the adoption of of the report and accounts, which was seconded by Sir EDGAR HORNE, Bart., and carried.

The CHAIRMAN proposed the re-election of Sir Edgar Horne as a Director of the Company. This was seconded by Mr. E. B. READ, and agreed to.

Thereafter the Company's Auditors, Sir Laurence Halsey and Mr. William C. Sneath, Partners in the firm of Messrs. Price, Waterhouse, & Co., were unanimously re-elected.

The CHAIRMAN then moved a vote of thanks to the staff of the Company, which was seconded by Mr. C. C. MALLETT.

This was carried, and the meeting terminated with a vote of thanks to the Chairman and Board of Directors on the proposition of Mr. F. ELIOT WILLIAMS, seconded by Sir JOHN MELLOR, which was unanimously carried and briefly acknowledged by the CHAIRMAN.

Cape Town and District Gas Light and Coke Company, Ltd.

ANNUAL GENERAL MEETING

The Forty-Second Ordinary General Meeting of the shareholders of the Cape Town and District Gas Light and Coke Company, Ltd., was held at the Company's Offices, 38, Grosvenor Gardens, S.W. 1, on Wednesday, May 18, at 12.30 p.m.—Mr. C. W. LILLEY, Chairman of Directors, presiding.

The MANAGING DIRECTOR AND SECRETARY (Mr. R. W. Blackburn) read the notice convening the meeting, together with the Auditors' report on the balance-sheet.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN, before moving the resolution for the adoption of the report and accounts for the year ended Dec. 31, 1931, referred first to the unavoidable absence of one of the Directors, Mr. R. A. Fairclough, who very much regretted being unable to be present at the meeting as the result of a cold. This was the first general meeting he had been unable to attend for some forty years, and he had asked the Chairman to express his regret to the shareholders.

Continuing, the Chairman said that, as they all knew, the year 1931 had been a year of world-wide depression. In this country they had had the phenomenon of high taxation; and the movement towards economy which had extended during the year from luxuries to necessities in many households had restricted enterprise in all commercial concerns and caused a very great amount of financial uncertainty. These had been the conditions not only in this country, but the world over; and South Africa had not been exempt from the operation of all these factors. There they affected every kind of business, and, in addition to these factors, South Africa had its own special problems to deal with as a gold-producing country. They would remember that this country went off the Gold Standard at the beginning of the Autumn of 1931; but South Africa, as a gold-producing country, elected to remain on the Gold Standard; this decision did not meet with unanimous approval in South Africa; it was at the time, and had remained ever since, a matter of acute controversy.

EFFECT OF REMAINING ON GOLD STANDARD.

The adherence of the Union of South Africa to the Gold Standard had its own special economic effect. It immediately produced a great deal of difficulty in the export industries. It became necessary for the Government to take steps to remove some of these difficulties so far as it could; the result was that subsidies had to be paid to various primary industries, and these subsidies could not be financed out of ordinary revenue. They were financed as far as possible by means of special taxes on imports; and those special taxes on imports, of course, had hit all businesses requiring to import goods from this or any other European country. There had been taxes to which they had become subject on the numerous materials they had to import from England—as they could not obtain them in South Africa. These economic difficulties caused a rise in the price of coal in South Africa. In addition, the railways were suffering from a lack of freights—just as the English railways were suffering—which made it necessary to raise their freight charges for coal by imposing a surcharge of 10d. per ton. Bunker coal was exempt from this tax; but all businesses using South African coal had been subject to this extra impost on the coal which had to be carried from the mines to the place of utilization.

All these had been the special factors affecting South Africa. The Chairman remarked that upon reference to his speech on this occasion last year he had told the shareholders that there were then no particular grounds for optimism. He thought he was right; but he did not envisage these special difficulties which they had had to face in 1931. In addition to this, they

had to realize that difficulties arose in regard to remittances from South Africa. These had been strictly controlled by the Government, and for a time they had great anxiety in regard to remitting money to this country. But fortunately they were well treated in this respect, which enabled them to carry on, and they hoped that the position had now crystallized itself into something nearer the normal. These were difficulties inherent in South Africa, but they also had their own special difficulties to cope with during 1931. Their Engineer in Cape Town, Mr. H. N. Port, who had been unwell for some time, found it necessary to come home on leave in June. He returned in November, but unfortunately was taken ill again on the voyage out, and they had been deprived of his services ever since. Mr. Port was now, he was happy to say, recovering, though his recovery after such a long illness must necessarily be slow. His absence coincided with the retirement of their General Manager, Mr. E. E. Gallagher, a month or two ago, after more than 28 years of loyal and valuable service to the Company.

In these circumstances it was not surprising that the accounts which they had before them should show somewhat less favourable results than those which they had seen for the two previous years.

The Accounts.

There were a few items in the accounts on which he proposed to comment. Turning to the revenue account, on the income side it would be seen that the total for the year was £97,046, which represented a drop in income of practically 6 p.ct. This was arrived at by a falling off of some £4000 in the income derived from the sales of gas and from meter rentals—this figure being £85,808. Residuals had also fallen off to an extent of about £1200, while the sale of fittings had realized £780 less. All these reductions were to be deplored, but he did not think that in view of the circumstances prevailing during the year, they were more than might reasonably have been anticipated.

On the expenditure side they had contemplated that they would have been able to make some savings. It would be remembered that they had No. 2 installation of retorts under reconstruction for a long time. The first setting of these retorts commenced gas-making on March 15, 1931. They had hoped that the second setting would have been completed in a short time after that, and they would then have been able, as they had hoped, to realize in the year under discussion some of the economies they had contemplated making by this installation. But a considerable amount of difficulty had been experienced by reason of the fact that they had to do the reconstruction work in three parts. They could not start dismantling the first setting until they had started work on the second, and the same applied to the second and third settings. So they had been quite unable to effect the economies they had hoped to do, though they were beginning to realize them now. The result was that the figures on the expenditure side of the revenue account were substantially the same as shown by the previous accounts.

The cost of manufacture and distribution of gas would have been lower had circumstances remained as they were when he last addressed the shareholders, the Chairman continued. But the cost of manufacture depended to a large extent upon the price of coal; and the price of coal and the freight charges had increased during the year; so that they were just not able to effect a saving, though the figure remained within £300 of the previous one. Repairs and maintenance were the same, while rents, rates, and taxes were £900 less. This last, however, was a balanced account, for on the one side they had rents received and on the other side rents paid; and in the previous year a reserve had been made which was not now required. There had been a slight saving in the figure for stationery, printing, and advertising, which saving had been effected on advertising—not a very desirable form of saving. But while they had been changing over to the new retorts they had not been able to push their business as much as they would have liked, which accounted for this. Interest, discounts, and allowances was a larger figure by about £1000; there had been an increase in borrowed money during the year. At the present time they had increased floating loans, and the interest charges thereon had been greater. The result was that the balance to be transferred to profit and loss account was less by £6600 than in the previous year.

Profit and Loss Account.

Turning to the profit and loss account, this showed a sum of £14,555 carried forward from revenue account. The difference on exchange amounted to £2648, and this, to the casual observer, might appear to be pure profit. But this was not so; for this exchange item was offset by expenditure on additional charges the Company had to bear, and unfortunately the difference in exchange did not nearly make up for the loss they suffered by reason of these extra charges. They had started an exchange account, and for this reason he wished to warn them against supposing that this item was one of pure profit. The result was a balance on profit and loss account carried to the balance-sheet of £9279. The balance-sheet items to which he desired to call their attention were not very many. On the liabilities side loans were increased. These stood at £33,000—or £7000 more than before. The reserve and contingency account had been maintained at the same figure of £80,000, which was a very satisfactory figure to have reached. There was another reserve fund called "Reserve for plant, &c., renewals." It stood at £17,660; from this had to be deducted the expenditure during the year of £13,593 on the new installation of retorts—or rather the renewal of the original settings. No doubt it might have been found perfectly justifiable to have added part of that figure to the assets side of the account; but they thought it better to deal with it as shown.

On the other side there was little to be said. The expenditure during the year which they had added was in respect of new mains and services, &c. From that figure they had written off £4000 for plant rendered obsolete, making a figure of £541,239, which closely approximated to the corresponding figure of the previous account. Hire fittings stood at £15,404—an increase of £850, while stock (including coal, residuals, meters, stoves, pipes, fittings, stores, &c.) was a very much smaller item this year—being £7700 less than previously. This was accounted for by the fact that last year's stocks included a great deal of the material subsequently utilized in the reconstruction work. There were no other items in the accounts to which he need direct their attention specially, and it only remained for him to say a word or two on general matters.

General Matters.

He had already indicated that there had been special difficulties during the year 1931. And in the year now in progress they would not have any troubles of this sort. From the latest reports to hand, they were now beginning to realize some of the economies which they contemplated as a result of their improved carbonizing installation; and although it was very difficult to make any sort of forecast in such a time as this, he did feel some confidence that they would be able to make substantial savings in manufacture and distribution. Of course, they could not say what the financial position in South Africa might be. One could not state what was in store for commerce in any particular country, but if matters went on as they were they hoped to effect economies. As to the business they hoped to do, it would be a rash man who would make any prophecy at all. The state of affairs in South Africa at the present time, he was afraid, gave little cause for optimism.

The results they had been able to place before the shareholders compared most favourably with most commercial concerns in the Union during the year. The year had been a very bad one for trade in general in South Africa, and there was at present no sign of an improvement. They had, however, been able to obtain some new and very substantial accounts just recently. They were exploiting every possible method whereby they might obtain better results from their existing accounts. But he was bound to admit that he did not regard it as probable that they could contemplate in the present year any real expansion of business; South Africa had been too hard hit for that to take place, and it was chiefly to economies made by themselves to which they must look in order to maintain their present position; he need hardly assure them that the attention of the Board and of the Officers on the other side was directed most keenly to effecting such economies.

The Chairman then formally moved that the report and statement of accounts for the year ended Dec. 31, 1931, be adopted, and that a final dividend on the ordinary shares of 3 p.ct. (making 6 p.ct. for the year with the interim dividend of 3 p.ct. already paid) be declared.

In regard to the dividend which was being recommended, the Chairman said that after the review of the situation he had given them he did not think any shareholder, with these matters in mind, would expect a larger distribution than 6 p.ct. in the present year. The Company had suffered very severely; there had been a substantial reduction in their income; and they considered it justifiable to recommend the declaration of a dividend of 6 p.ct. this year. He hoped that having heard what he had said, the resolution was an agreeable one.

Some Working Results.

Mr. Blackburn, in seconding the resolution moved by the Chairman, said that it was usual on these occasions for him to refer to a few points of interest in regard to details of their work. They had increased the mileage of their mains by just over 2½ miles, bringing the total up to nearly 143. For the first time in many years he was sorry to report a decrease in the number of consumers, though it was not a very serious one. They had lost 61 ordinary and 35 slot consumers, bringing the total down from 7500 to 7404—a decrease of 96. On the other hand, they connected up 116 new cookers, 140 geysers and water heaters, &c., and 46 grillers; the new gas appliances placed in commission during the year totalled over 300. They had a decrease in prepayment cookers due to causes the Chairman had mentioned; but the number of prepayment cookers still in use remained at the satisfactory figure of some 4700. In addition, gas appliances on hire at 3212 showed an increase of 139. The average consumption per consumer had declined, and this was more particularly noticeable in the case of the large consumers who used gas for industrial purposes. He thought it might be of interest to mention that they had lost none of their large consumers, though the consumption had been reduced, generally speaking, in the case of all their industrial customers. These included biscuit makers, newspaper and printing works, large hotels and restaurants, &c., and he was pleased to say they still retained as large consumers the South African Railways, the Cape hospitals, the public works department, and others of similar character, so that the gas supply of Cape Town was well entrenched. It was rather unfortunate that the completion of reconstruction work should coincide with a period of sustained industrial depression; but a policy of expansion designed to operate 6000 miles away could not be improvised suddenly or executed hurriedly; it called for planning in advance, first, in relation to finance; secondly, in regard to production; and, thirdly, as to distribution and selling organization.

He referred to the retirement of three old employees of the Company. The Company, he said, was served by a very loyal body of workers, and as a result of re-organization consequent upon these retirements, they hoped to effect economies without impairing the efficiency of their staffs. Mr. Gallagher had held the position of General Manager, as the Chairman had

stated, for a long period. It gave the greatest pleasure to record that he (Mr. Gallagher) had retired with the best wishes not only of the Directors, but of all of the employees in South Africa. He must also refer to the retirement of Mr. F. D. Kent from the position of Chief Clerk and of Mr. C. H. Jackman from that of Head Storekeeper at Cape Town. Both had been in service upwards of 30 years and left a fine record of conscientious and loyal service which it was hoped their successors would endeavour to emulate. They had the best wishes of all in their retirement. He had pleasure in formally seconding the resolution for the adoption of the report and accounts as moved.

Position on the Whole Favourable.

Mr. E. Nicholls said that he came prepared to hear a much less favourable review, and he felt more satisfied now than when he received the report. The position on the whole was not unfavourable, having regard to the world conditions as well as the conditions in South Africa, and they had reason to be well satisfied with the statement. One wondered, he continued, whether it was necessary to give the Company such a set back as to revert to a lower dividend; but he recognized that the Board had a better inside knowledge of the circumstances. They were safeguarding the future rather than looking only to the present; but they had hopes of returning to the 7 p.ct. dividend which they had received in the past. Altogether, however, he was pleased with the review; it was better than he had anticipated.

Mr. T. E. Paddon associated himself with the remarks of the previous speaker, and he considered it a very good report indeed in the circumstances. He realized perfectly well the difficulties they had had to contend with, and he only hoped that the feeling of optimism for the coming year would materialize. He was disappointed that it was necessary to reduce the dividend, especially as a new source of income had been opened up in the matter of exchange, and he knew that many firms were reaping the advantage of that extra exchange, which amounted to anything from 33⅓ to 25 p.ct. And if South Africa decided to go on sterling they would certainly lose this source of revenue.

The Chairman, in reply, cautioned shareholders against regarding this as a real source of revenue. It was more than offset by the extra charges imposed, and so far as they were concerned they would not be dissatisfied if South Africa did go off the Gold Standard and adopted sterling. As they knew, the present South African Government remained strongly in favour of the gold standard, and there appeared no immediate likelihood of a change. As to the dividend, he appreciated that the Board had to ask the indulgence of the shareholders to some extent. They made this recommendation having regard to the falling off in the income of the Company. What they would like to see was an increase in income. To rely for adjustment upon savings in administration, manufacture, or distribution was a process which could not continue for ever, and they thought that in the circumstances the shareholders would be willing to accept a recommendation for a lower dividend—made only after the fullest possible consideration.

The resolution was then put to the meeting and carried unanimously.

Re-Election of Director and Auditors.

Sir George Barstow, K.C.B., moved the re-election of Mr. Lilley as a Director of the Company. Mr. Lilley, observed Sir George Barstow, and his father before him, had given long years to the service of the Company, and the present Chairman devoted a great deal of time to its interests.

Mr. W. J. Bradford seconded the resolution, remarking that he was sure they could not leave the destiny of the Company in better hands.

This was unanimously agreed to, and the Chairman briefly acknowledged his appreciation of the observations which had been made in re-electing him. He had a hereditary interest in the Company which increased as the years went by.

Mr. E. Nicholls proposed, and Mr. T. E. Paddon seconded, the re-election of the Company's Auditors, Messrs. Kemp, Chatteris, Nichols, Sendell, & Co., which was agreed to.

Vote of Thanks to Chairman, Directors, and Staff.

Mr. A. E. Hayes then proposed a vote of thanks to the Chairman, Directors, and staff of the Company, which was seconded by Mr. S. J. Tungay, and carried unanimously.

The Chairman briefly acknowledged the vote on behalf of the Board, and said that it should be conveyed to the staff.

This concluded the business of the meeting.

Colombo Gas and Water Company, Ltd.

ANNUAL GENERAL MEETING

The Annual General Meeting of the Company was held at 148, Gresham House, Old Broad Street, E.C., on Monday, May 9—Mr. Robert H. Glen, F.C.A. (Chairman), presiding.

The Secretary (Mr. A. C. Pullen) read the notice convening the Meeting and the Auditor's Report.

The Chairman: Gentlemen, a copy of the Report and Statement of Accounts having been sent to all the Members, I will ask you to take them as read.

Our Meeting is being held only a few days later than in last year, although the final local Rupee Accounts were not despatched from Colombo until nearly three weeks after the date the 1930 local Accounts left there in 1931. The delay was due to the decease in December of our late Accountant, Mr. Bird, who had rendered faithful service to the Company for 22 years and who formerly was engaged in the Secretary's Office here. I just take this opportunity of acknowledging the kindly co-operation of our Auditor, Mr. Cash, Junior, whose work has been carried out under some pressure.

The general trade of Ceylon during 1931 continued very poor. An Ordinance for imposition of Income-Tax has been passed and the Import Duties have been considerably increased. As regards Local Income-Tax, matters are as yet indefinite, but we hope our local liability will be to a great extent allowed as a deduction against the British Income-Tax. Speaking to you in May last, I then stated that there appeared no hope of the loss in our output of gas being regained during the year, and I regret outputs and sales shewed considerable diminution. Still, on the other hand, the gas sent out for first four months of the current year is about 4 per cent. better than in corresponding period of 1931.

On referring to the Accounts, the addition to Capital amounted to £818 only, principally for Mainlaying work. No expenditure of a heavy nature is under consideration.

The cost of Coal was slightly less—we used 430 tons more, but the rate shewed a further drop, this time by 61 cents per ton. You will, perhaps, ask why more Coal was used coincident with diminished gas sales, the explanation being a lesser make per ton.

Working Expenses were Rs. 5,880 less, the cost of wages being down.

Wages for Fitting Work amounted to Rs. 23,651, as compared with Rs. 26,650.

Bad Debts were considerably up this time, and have been adversely affected by the affairs of a former very large Consumer now deceased. We hope to recover some portion of the charge.

Depreciation, &c., of Stock was much the same as before.

Passages A/c. was heavy, for special reasons, but should be low in the current year.

The items for Fixing Cookers and Fixing Geysers were much about the same.

The Bonus to Local Staff and Workmen cost Rs. 30,441 as compared with Rs. 51,124.

On the credit side of the Revenue, Gas Rentals fell from Rs. 838,306 to Rs. 726,497, accounted for by lesser consumption both for private lighting and for heating. We reduced our rate for Private Lighting by 50 cents as from 1st October and hope the lower price will steady this branch of our business. The gas used for Street Lighting showed a satisfactory increase and we are doing all that is possible as regards the Public Lighting by special attention and low charges.

Receipts from Residual Products are slightly down, but this important matter receives the closest attention and I think you will agree that a net return from Residuals of 75 per cent. on cost of Coal shews good working and keen buying of Coal.

The Accounts grouped under the head of Gas Fittings fell from Rs. 85,428 to Rs. 78,304.

The final profit for the year is very much less. I think no assurance is needed that the maintaining and enlarging of our business is always under the Board's consideration.

The Balance Sheet shows that our Investments, Cash, Stores and Debtors are £68,158 in excess of cash liabilities, which is a very safe and satisfactory position.

I think these are all the comments I need make on the Accounts, but shall be pleased to answer any questions thereon which you may care to put to me.

The balance of Net Revenue is £19,762 and the Directors recommend a final Dividend of 3½ per cent. on the Preference Shares and a final Dividend on the Ordinary Shares of 5 per cent., both less Tax, also that £1,000 be added to General Reserve, which will then stand at £72,480.

You may be interested to know that the total mileage of Gas Main in Colombo is now over 126 miles.

At the end of the year, Mr. A. A. Johnston, one of your Directors, visited Colombo and it is perhaps scarcely necessary for me to emphasize the value to the Company of his stay there for the purpose of going into the Company's affairs on the spot.

Our Engineer and General Manager, Mr. Barker Johnson, was home on leave last year and was present at our Annual gathering in May. Mr. Barker Johnson's keenness and his ability are known to you all.

With these remarks, I have pleasure in moving that the Report and Accounts be received and adopted.

Mr. John G. Wardrop seconded the motion. In view of the mileage of Main mentioned by the Chairman, the question of leakage was raised and congratulations were offered at the figure shewn for the year, viz., 4·40 per cent.

The adoption of the Report and Accounts was unanimously carried.

The Chairman then moved the following Resolution:—

"That a Dividend for the year ended 31st December, 1931, at the rate of seven per cent. per annum upon the

Preference Shares, less Income-Tax and ten per cent. per annum upon the Ordinary Shares, less Income-Tax (both less Interim Dividend paid 15th October, 1931) be and is hereby declared, the Warrants to be payable on 13th May, 1932,"

which was seconded by Major HERIOT R. GLEN and carried unanimously.

Mr. A. W. OKE proposed the re-election of Mr. Robert H. Glen and Mr. John G. Wardrop as Directors of the Company and referred to the difficult times through which all are passing, stating further that the Board had proved very competent in the past and had stood well to the Shareholders. Mr. A. E. HAYES seconded the motion, which was carried unanimously and the Chairman, in returning thanks, said he saw no reason why the position the Company now has, and the Dividend being paid, should not be maintained.

Mr. H. GAGE EDWARDS proposed that Mr. William Cash, Junr., M.A., F.C.A., be re-elected as Auditor for the current year at a fee of ninety guineas and said that Shareholders appreciated the information as to Mr. Cash's efforts made lately.

Mr. SYDNEY J. TUNGAY seconded the Resolution, which was carried unanimously.

Mr. A. E. HAYES, proposing a vote of thanks to the Company's Officials in Colombo and here, specially referred to the work of Mr. Johnson and Mr. Pullen. Mr. SYDNEY J. TUNGAY seconded the motion, which was unanimously carried.

A vote of thanks to the Chairman and Directors, proposed by Mr. A. E. HAYES and seconded by Mr. SYDNEY J. TUNGAY, concluded the proceedings.

The Year's Working at Belfast

A decrease of £27,317 in the gross profits on the manufacture of and sale of gas and residuals in Belfast for the year ended March 31 last is attributed by Mr. J. D. Smith, the Engineer and Manager of the Gas Department, to general depression in business. The profit was £123,248, to which must be added the amount received from dividends and interest on reserve funds investments and the rents from property, making a total of £139,995. From this was deducted income-tax, dividends,and interest on stock, equivalent of interest on redeemed stock and mortgages, leaving a net profit of £69,423. A sum of £21,383 has been set aside for redemption of stock and mortgages, leaving £48,039. To this has to be added the balance brought forward from last year of £44,155, making a total of £92,125. Various allocations are made from this sum to reserve and other funds, and also for interest and sinking fund on City Hall stock—a total of £68,583—leaving a balance to be carried forward to the credit of appropriation account of £23,612.

There were decreases in revenue from gas and public lighting of £19,655, from coke of £8109, and from tar and ammonia of £10,028. There was an increase in expenditure on the maintenance of mains, service, and prepayment system of £9725, and also an increase in revenue from automatic meters and stove department of £3938, and a decrease in expenditure for coal of £14,893 and for oil of £3863.

The gas made amounted to 4189 million c.ft.—a decrease of 76 millions on the previous year. Of the gas made 71·35 p.ct. was coal gas and 28·65 p.ct. water gas. During the year they carbonized 167,870 tons of coal—a decrease of 8577 tons. The price paid was about 6d. per ton less. The gas made per ton of coal used was 17,808 c.ft., as against 17,760 c.ft. last year. The gas oil used was 2,134,991 gallons, as compared with 2,048,338 gallons.

They were constantly adding to the number of consumers of gas, and the meters now in use amounted to 106,606, an increase of 1909. It had been their policy for a considerable number of years to supply a cooker free of charge to each prepayment consumer. During last year they changed the type of cooker and were now supplying a larger and better one to each new auto-meter consumer. They had already fitted 3249 such cookers.

The balance from the chemical department amounted to £49,811, as against £59,839 last year, a decrease of £10,028.

As regards tar, their production was slightly less than the previous year. In April last year the new coal-tar motor fuel, which they had since put on the market, was given the first test. Since then it had been tried out under all working conditions, and there was no doubt it was only a matter of time before this fuel ultimately proved itself to be the most economical and efficient for heavy motor haulage.

The Gas Committee have adopted the report and placed on record their appreciation of the excellent results obtained in the undertaking during the year, notwithstanding acute trade depression generally, and of the very efficient manner in which the Manager and his staff carried on the undertaking during that period.

PARLIAMENTARY INTELLIGENCE

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Kettering Gas Bill has been passed by the Examiners, read a second time, and committed.

The Oakham Gas and Electricity Bill has been referred to the Examiners.

Special Orders.

The Willenhall Gas Order and the Shanklin and Ventnor Gas Order have been approved.

A Special Order on the application of the South Yorkshire and Derbyshire Gas Company has been laid before the House and referred to the Special Orders Committee.

Gas Undertakings (Powers of Investment).

The report and minutes of evidence of the Joint Committee have been presented and ordered to lie on the table and to be printed.

House of Commons.

Private Bills.

The South Suburban Gas Bill has been put down for consideration by Group " F " Committee to-day.

The Oakham Gas and Electricity Bill has been considered on report, read a third time, and passed.

Special Orders.

The Willenhall Gas Order has been approved, and the Shanklin Gas Order has been put down for approval.

A Special Order on the application of the South Yorkshire and Derbyshire Gas Company has been presented and ordered to lie on the table of the House.

Profits of Gas Undertakings.

Mr. Daggar asked the President of the Board of Trade the profits of the companies' and local authorities' gas undertakings in Great Britain for the years 1930 and 1931; the price paid per ton for coal; and similar particulars with regard to the generation of electricity and the production of coke. Mr. Runciman furnished the following return in respect of gas undertakings, and promised that similar information for electricity would be forwarded. No particulars were available regarding the price of coal used for gas-making, or in regard to the coke oven industry.

Statutory Gas Undertakings.

COMPANIES—YEAR 1930.

Total Capital (Share and Stock) Paid Up.	Total Loan Capital (including Debenture Stock) Issued.	Revenue Account.		
		Receipts.	Expenditure.	Excess of Receipts over Expenditure.
£	£	£	£	£
89,865,241	32,876,965	44,845,198	37,781,061	7,064,137

LOCAL AUTHORITIES—YEAR 1930-31.

Total Amount of Money Borrowed.	Total Amount of Loans Repaid and Balance in Sinking Fund.	Revenue Account.			Interest Paid on Loans, Amount of Loans Repaid, and Amount Placed to Sinking Fund During Year.	Net Surplus.
		Receipts.	Expenditure.	Excess of Receipts over Expenditure.		
£	£	£	£	£	£	£
74,142,698	43,707,360	22,141,602	17,894,018	4,247,584	3,534,520	713,064

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The heavy demand for "safety-first" securities continued unabated last week, and the majority of these stocks are now on practically a 4 p.ct. basis. This in itself is a very satisfactory state of affairs, but the fact that the bulk of Stock Exchange business is almost limited to these securities leaves no doubt that a lack of confidence in the industrial market still persists. It remains to be seen whether the Lausanne Conference will in any way assist in dispelling some of the present uncertainty, but so far there have been no indications that the Stock Exchange has anticipated any improvement.

Gas stocks and shares were again in demand and prices responded in consequence. Most of the improvements last week were in ordinaries, and the highest increases were those of 4 points each in South Shields consolidated (at the Newcastle Exchange) to 130 and Southampton 5 p.ct. to 81½, Lea Bridge coming next with a gain of 3 points to 136½. Gas Light £1 units were particularly active and the price moved up 3d. to 21s. 3d., business being done at 21s. 6d. The Newcastle Company's stocks were also in demand at the local Exchange, and the £1 units gained a further 3d. to 19s. 6d. It is interesting to note that a year ago the Gas Light units stood at 19s., while the Newcastle units were 16s. 6d. only. South Metropolitan ordinary gained 2 points to 105½, and the 6 p.ct. preference at one time changed hands at 120, the highest price recorded in its history. There was little debenture stock available, but the few sales recorded were made at higher prices than the previous week.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *May* 23.

There is little change in the values of tar products, which remain as follows:

Pitch is firm at 95s. per ton f.o.b.

Creosote, for export, varies from 3¾d. to 5d. per gallon f.o.b., according to specification.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 7d. per gallon at makers' works; pure benzole, 1s. 8d. per gallon; 95/160 solvent naphtha, about 1s. 4½d. to 1s. 5d. per gallon; and pyridine bases, 3s. 9d. to 4s. per gallon.

Tar and Tar Products in the Provinces.

May 23.

The average prices of gas-works products during the week were: Gas-works tar, 34s. 6d. to 39s. 6d. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 10d. to 1s. 10½d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 3d. Heavy naphtha, North, 11d. to 11½d. Creosote, *ex* works, in bulk, North, liquid and salty, 2¾d. to 3¼d.; low gravity, 1¼d.; Scotland, 2¾d. to 3¼d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid, 60's, 1s. 8d. to 1s. 9d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2¼d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *May* 21.

Although orders are not numerous, quotations remain steady, particularly for the heavy distillates.

Crude gas-works tar.—Actual value is 55s. to 60s. per ton *ex* works.

Pitch.—Makers are not offering for forward shipment, and export price is nominal at 82s. 6d. to 87s. 6d. per ton f.o.b. Glasgow. Value for home consumption is 85s. to 90s. per ton *ex* works in bulk.

Refined tar to Ministry of Transport Specification remains firm at 4¼d. to 4¾d. per gallon f.o.r. in buyers' packages, but weather conditions are affecting deliveries adversely.

Creosote oil.—Best grades continue to find a ready outlet, and quotations for all grades are steady. B.E.S.A. Specification is 3¼d. to 3¾d. per gallon; low gravity, 3¾d. to 4d. per gallon; and neutral oil, 3¾d. to 4d. per gallon—all f.o.r. in bulk quantities.

Cresylic acid.—Orders are few and far between, and prices are therefore unstable. Pale, 97/99 p.ct., is 1s. 1d. to 1s. 2d. per gallon; dark, 97/99 p.ct., 1s. to 1s. 1d. per gallon; and pale, 99/100 p.ct., 1s. 3d. to 1s. 4d. per gallon—all f.o.r. works.

Crude naphtha.—Supplies are short and value is 4¼d. to 5d. per gallon, according to quality and district.

Solvent naphtha.—This market is dull and uninteresting. 90/160 grade is 1s. 2¼d. to 1s. 3¼d. per gallon, and 90/190 grade 11d. to 1s. per gallon.

Motor benzole.—Makers are quoting 1s. 2d. to 1s. 3d. per gallon in bulk *ex* works, but orders are scarce.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor ,,	1	2	,,	1	3	,, ,, ,,
Pure ,,	1	6	,,	1	7	,, ,, ,,

New Capital Issues.

Bristol Gas Company.—This Company are issuing £200,000 general capital stock (5 p.ct. maximum) at £94 10s. p.ct. The subscription list will close to-morrow. Reference to this issue is made in our News Columns to-day.

Uttoxeter Gas-Works, Ltd.—At a sale on Wednesday last at the Cross Keys Hotel, Uttoxeter, there was brisk bidding for 25 ordinary "A" shares of £5 each in the Uttoxeter Gas-Works, Ltd., which declared a dividend last year of 15 p.ct. These went for £8 each, while ten ordinary "B" shares of £5 each were withdrawn at £7 10s. each. A block of 120 6 p.ct. £5 preference shares in the same Company were sold at par.

Contracts Advertised To-Day.

Coal.

The Gloucester Gas Light Company invite tenders for coal. [Advert. on p. 456.]

The Nantwich Gas Department invite tenders for the supply of coal. [Advert. on p. 456.]

The Silsden Gas Department invite tenders for the supply of coal. [Advert. on p. 456.]

The Newport (Salop) Gas Department invite tenders for the supply of coal. [Advert. on p. 456.]

General Stores, Gas Fittings, Tools, Oils, and Paints, &c.

The Birkenhead Corporation invite tenders for the supply of stores and materials for their Gas Department. [Advert. on p. 456.]

Meters.

The Birkenhead Corporation invite tenders for the supply of gas meters, &c. [Advert. on p. 456.]

Pipes, &c.

The Birkenhead Corporation invite tenders for the supply of wrought and cast iron pipes and fittings. [Advert. on p. 456.]

Purifiers and Purifier House.

The Barry Urban District Council invite tenders for the supply and erection of two purifiers and house and alteration to existing purifiers. [Advert. on p. 456.]

Trade Notes.

Complete Gasification Plant.

The Linlithgow Gas Company, Ltd., have placed an order with Messrs. Tully, Sons, & Co., Ltd., for one 50,000 c.ft. per day capacity coal gasification plant, complete with waste-heat boiler and patent automatic operator.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. May 21. (Provincial Exchanges May 20.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Apl. 4	7⅞	7⅞	Alliance & Dublin Ord. ...	100—105	...	102½—103½
374,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
557,655	,,	Mar. 14	7	7	Barnet Ord. 7 p.c.	127—132	...	...
300,000	1	Apl. 29	1/4½	1/9⅔	Bombay, Ltd.	15/—20/-	...	17/—18/-
177,750	10	Feb. 29	9	9	Bournemouth 5 p.c. ...	15—16	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12½—13½	...	...
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	11—12	...	...
50,000	Stk.	Dec. 14	3	3	Do. 3 p.c. Deb. ...	62—67	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	83—88	...	85
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	105—108	...	107
					Brighton, Hove, & Worthing			
357,900	,,	Mar. 14	7½	7½	6 p.c. Con. ...	122—127	...	126½
540,000	,,	,,	6½	6½	Do. 5 p.c. Con. ...	109—114	+1	111½ 113
195,500	,,	,,	6	6	Do. 6 p.c. B Pref.	114—119	...	117½
1,287,500	,,	Feb. 29	5	5	Bristol 5 p.c. max.	96—98[a]	−1	...
120,420	,,	Jan. 4	4	4	Do. 1st 4 p.c. Deb. ...	83—86[a]	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	83—86[a]	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	99—101[a]	+2½	...
855,000	,,	Apl. 4	7	8	British Ord.	113—118	+1	114—117
100,000	,,	Jan. 4	7	7	Do. 7 p.c. Pref.	115—120	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	77—82	...	78½—80
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	98—103	...	...
160,000	,,	Jan. 4	5	5	Cambridge 5 p.c. Deb. ...	100—105	...	...
100,000	10	Nov. 30	8	6	Cape Town, Ltd.	7½—8½	...	...
100,000	10	Apl. 29	4½	4½	Do. 4½ p.c. Pref. ...	6—7*	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	76—81	...	...
626,860	,,	Feb. 15	6	6	Cardiff Con. Ord.	93—96	...	...
237,860	,,	Jan. 4	2½	5	Do. 5 p.c. Red. Deb.	97—102	...	...
157,150	,,	Feb. 15	5	6½	Chester 5 p.c. Ord.	87—92[b]	...	...
98,936	1	Oct. 5	1/-	2/-	Colombo, Ltd. Ord.... ...	27/—32/-	...	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	17/—19/-	...	...
609,204	1	Apl. 4	-/10'90	-/11'47	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	...
296,053	1	,,	1/2·54	1/3·30	Do. 8 p.c. Pref.	10/—15/-	...	...
2,073,280	Stk.	Feb. 15	5	5½	Commercial Ord.	96—99	...	97—99
475,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	61—64	...	...
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	118—123	...	120
469,590	,,	,,	5	5	Do. max. div.	82—87	...	...
500,000	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	100—105	...	105½
542,270	,,	Feb. 29	7	10	Derby Con.	117—122[c]	...	...
55,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	65—70[c]	...	...
209,000	,,	Mar. 14	5	5	East Hull Ord. 5 p.c. ...	75—80	...	...
179,500	,,	Feb. 29	5½	5½	East Surrey Ord. 5 p.c. ...	93—98	...	97—97½
155,019	,,	Jan. 4	5	5	Do. 5 p.c. Deb. ...	97—102	...	...
1,002,180	,,	Mar. 14	†4	†6½	European, Ltd.	90—100	...	92—95
19,405,992	,,	Feb. 15	5⅞	5⅞	Gas Light & Coke 4 p.c. Ord.	20/9—21/9[f]	+·/6	20/10½—21/6
2,600,000	,,	,,	3⅛	3⅛	Do. 3⅛ p.c. max. ...	65—69	+1	67—68½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	82—86	...	83½—86
6,102,497	,,	Dec. 14	3	3	Do. 3 p.c. Con. Deb. ...	66—69	+1	66½ - 68
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	104—107	...	...
2,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	99—102	+1	100—101¾
162,280	,,	Feb. 29	10	10	Harrogate Cons. 10 p.c. max.	157—162	...	...
82,500	,,	Mar. 14	7	7	Hastings & St. L. 5 p.c. Conv.	103—108	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	82—87	...	...
70,000	10	9 Oct. '30	½	10	Hongkong & China, Ltd. ...	11—12	...	...
213,300	Stk.	Feb. 29	6	6	Hornsey Con. 3½ p.c. ...	87—90	...	...
5,600,000	,,	Oct. 30	25	15	Imperial Continental Cap.	162—172	...	165—170½
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb.	72—77	...	75
235,242	,,	Mar. 14	8½	8½	Lea Bridge 5 p.c. Ord. ...	134—139	+3	135—138
2,145,907	,,	Feb. 29	6	6	Liverpool 5 p.c. Ord. ...	105½—106½[b]	+½	...
245,500	,,	—	—	5	Do. 5 p.c. Red. Pref. ...	97—102[b]	...	...
306,083	,,	Jan. 15	4	4	Do. 4 p.c. Deb. ...	85—90[b]	...	...
165,736	,,	Feb. 15	8	10	Maidstone 5 p.c. Cap. ...	124—129	...	...
56,176	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	57—62	...	...
75,000	5	Nov. 30	‡10	‡10	Malta & Mediterranean ...	7—8	+½	6¾
892,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	77—82	...	80
171,978	Stk.	Feb. 29	5	5	M. S. D. Utility "C." Cons.	76—81	...	...
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	75—81	...	79—80
112,126	,,	g	4	4	Do. 4 p.c. Deb. ...	77—82	...	...
148,955	,,	g	5	5	Do. 5 p.c. Deb. ...	97—102	...	...
675,000	,,	May 21	‡6	‡6	Montevideo, Ltd.	60—70	...	...
2,061,315	,,	Feb. 29	5	5½	Newcastle & Gateshead Con.	19/—20/-[d]	+·/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	78—80[d]	+2½	...
691,705	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	68—70[d]	...	...
277,285	,,	Oct. 30	5	5	Do. 5 p.c. Deb. '43...	99—101[d]	...	...
199,940	,,	Mar. 14	7½	7½	North Middlesex 6 p.c. Con.	106—111	...	...
396,160	,,	Feb. 15	5	5	Northampton 5 p.c. max. ...	78—83	...	...
300,000	,,	Apl. 18	9	7	Oriental, Ltd.	85—95	...	...
205,163	,,	Jan. 4	8	8	Plym'th & Stonehouse 5 p.c.	127—132	...	129
504,416	,,	Feb. 15	8	8	Portsm'th Con.Stk. 4 p.c.Std.	126—131	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	78—83	...	...
114,000	,,	Feb. 15	5	5	Preston 5 p.c. Pref.	94—99	...	...
686,312	,,	Jan. 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	77—82	...	...
389,813	,,	Jan. 4	4	4	Do. 4 p.c. Cons. Deb.	77—82	...	...
150,000	10	Apl. 4	6	6	San Paulo 6 p.c. Pref. ...	7—7½	...	...
1,786,968	Stk.	Apl. 4	6	6	Sheffield Cons.	101—103[e]	...	...
95,000	,,	Jan. 18	4	4	Do. 4 p.c. Deb.	79—81[e]	...	...
133,201	,,	Feb. 29	8½	5	Shrewsbury 5 p.c. Ord. ...	95—100	...	...
90,000	10	June 11	‡5	‡5	South African	3—5	...	...
6,709,895	Stk.	Feb. 15	5	7	South Met. Ord.	104—107	+2	103½—105½
1,185,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	115—120	...	119—120
1,895,445	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	63—66	...	64½
1,000,000	,,	Jan. 18	4	5	Do. 5 p.c. Red. Deb.	102—105	...	...
91,500	,,	Feb. 29	8½	8½	South Shields Con.	129—131[d]	+4	...
1,543,795	,,	Feb. 15	6½	6	South Suburban Ord. 5 p.c.	102—107	...	105¼—106½
300,000	,,	,,	5	5	Do. 5 p.c. Pref.	97—102	...	...
668,837	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	101—106	...	...
647,740	,,	Feb. 29	5	5	Southampt'n Ord. 5 p.c. max.	79—84	+4	79—83
121,275	,,	,,	4	4	Do. 4 p.c. Deb.	77—82	...	79
250,000	,,	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	98—102	...	98½
200,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	...	...
1,076,490	,,	Feb. 29	6½	6½	Tottenham and District Ord.	106—111	...	109—110
300,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	102—107	...	...
199,005	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	77—82	...	...
85,701	,,	Apl. 4	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	70—75	...	...
346,069	,,	Feb. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	101—106	+1	103
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	95—100	...	...
1,822,220	,,	Feb. 29	7	7	Wandsworth and District: Consolidated	117—122	...	122
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	98—103	+1	101—102½
1,167,964	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	103—106	+1	104½—106
158,400	,,	Feb. 29	5	6A	Winchester W.& G.5p.c.Con.	85—90	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g* The interest due 1/1/32 was paid on that date. *h* Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. =10 p.ct. p.a. less tax and less tax on interim dividend.

STOCK ISSUES.

By Order of the Directors.

THE LEWES GAS COMPANY.

Messrs. A. & W. RICHARDS

are Instructed to OFFER FOR SALE BY TENDER

£10,000

FIVE PER CENT. PERPETUAL DEBENTURE STOCK.

Minimum Price of Issue, Par.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Tuesday, the 31st of May) may be obtained of A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

THE SOUTH SHIELDS GAS COMPANY.

SALE OF £20,000 ORDINARY STOCK.

THE Directors Offer for Sale by TENDER the above Stock, to be issued under the provisions of the South Shields Gas Acts, 1904 and 1919. Applications receivable up to 10 a.m. on Tuesday, the 31st of May, 1932.

The Standard Rate of Dividend is £5 per cent. per Annum; over the last eleven years the Dividend paid has been at the rate of £5 15s. per cent. per Annum.

Any amount of Stock, being not less than £10, or a multiple thereof, may be tendered for.

A deposit of £10 per cent. on the Nominal Amount of Stock applied for must accompany each Tender, and the balance of the purchase money must be paid on or before the 27th of June, 1932.

Minimum Price, £90 per cent.

The Stock will be registered in the name of the purchaser free of expense, and will rank for Dividend as from the 1st of July, 1932.

Copies of Prospectus, with Form of Tender and last Report and Accounts, will be sent on application to the undersigned.

A. PICKERING,
Secretary.

Gas Offices,
Chapter Row,
South Shields,
May 18, 1932.

By Order of the Directors.

THE READING GAS COMPANY.

SALE BY TENDER OF

£60,000

5 PER CENT. REDEEMABLE PREFERENCE STOCK,

Redeemable at Par July 1, 1960.

Minimum Price of Issue, £98 per £100 Stock.

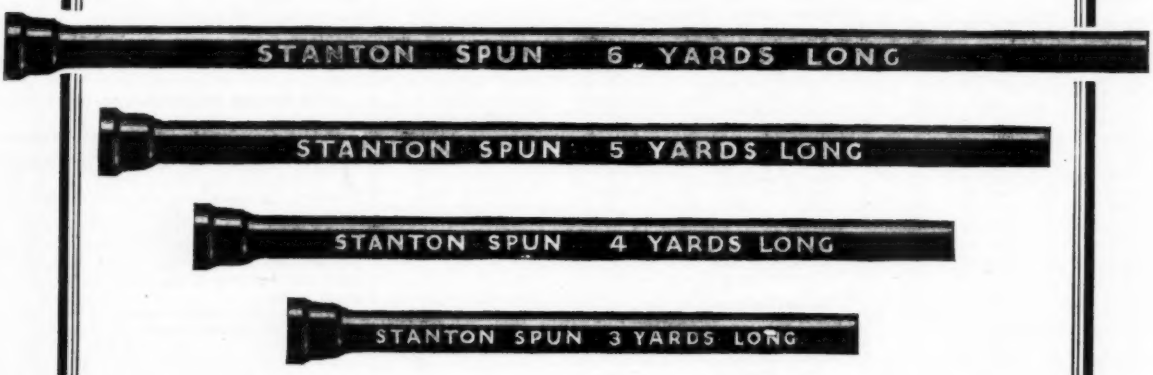
Prospectus and Form of Tender (which latter must be sent in by Monday, June 6, 1932) may be obtained from the SECRETARY, READING GAS COMPANY, 159, FRIAR STREET, READING.

STANTON

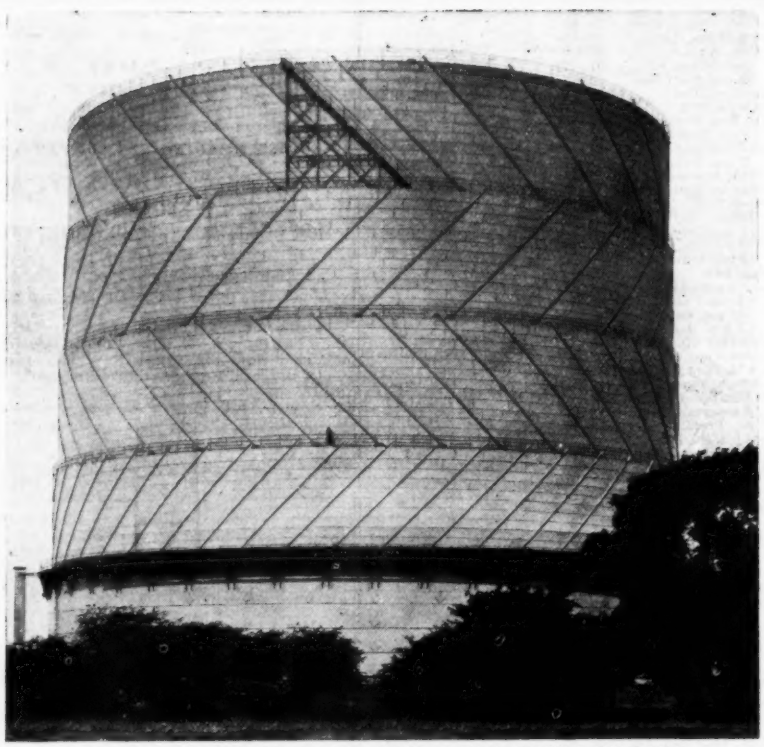
DELAVAUD

Spun Iron Pipes

3, 4, 5 and 6 Yards Long



The Stanton Ironworks Company Limited Nr. Nottingham



VIEW OF LEICESTER'S NEW 5 MILLION HOLDER.

"SPIRALLY GUIDED GASHOLDERS."

During experience extending over

35 YEARS.

R. & J. D. have secured a reputation for dependability of erection, and their improved methods of construction are of world-wide renown.

R. & J. D.'S NEW SYSTEM

of rapid and positive carriage lubrication marks further progress.

R. & J. DEMPSTER, LTD., MANCHESTER.

LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W.1.

CONTENTS

EDITORIAL NOTES.

A GLANCE AT THE CONTENTS . . . 491
The New Coal Mines Bill 492
A Fascinating Story 492
An Engineering Triumph 492
Aspects of Economy 493
Too Many Meetings? 493
A Concrete Case 493
Machines in the Office 494

Forthcoming Engagements 491
Personal 495
Obituary 495

NEWS OF THE WEEK.

Paragraphs 495
Floods in the Rotherham District 495
Signs of Improving Conditions 496
Exhibition at Swansea 496
New Issue of Capital at Bristol — Over £1,000,000 Offered 496

NEWS OF THE WEEK—*(continued)*.

Successful Gas Exhibition 496
Scottish Junior Gas Association (Eastern District) 496
Institute of Physics 496
Gas Lighting in Sheffield 497

SPECIAL ARTICLES, &c.

Gas Driven Motor Transport 499
Institution of Gas Engineers—
The Sussex Tour 500
Coke Oven Gas in the Iron and Steel Industry. By Dr. Ing. H. Lent 502
A Research Gas-Works 511
Reviews 512
New Process for the Steaming of Retorts . 513

"JOURNAL" TECHNICAL RECORD.

Society of British Gas Industries—
Annual Dinner 497
Report of the Council for 1931-32 . . . 514
General Business 515
Presidential Address of Lord Eustace Percy 516
Wales and Monmouthshire Association of Gas Engineers and Managers—
Annual General Meeting at Swansea . . 520
Presidential Address of Mr. Ernest Ablett 521
Luncheon 525
Inspection of the Morriston Works . . . 526
Golf Meeting 526

MISCELLANEOUS.

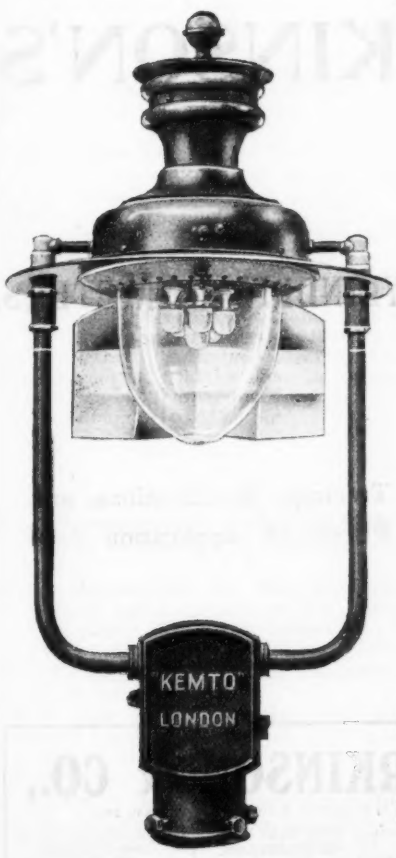
Croydon Gas Company's Co-Partnership . 527
Parliamentary Intelligence—
South Suburban Gas Bill 528
House of Lords 531
House of Commons 531
Mid-Southern Utilities Bill 532
The South African Lighting Association, Ltd. 529
Report of the Livesey Professor at Leeds. . 532
Primitiva Holdings, Ltd. 530
Hong Kong and China Gas Company, Ltd. . 530
Trade Notes 534
Gas Acts (1920 and 1929) Orders 534

GAS MARKETS AND MANUFACTURES.

Stock Market Report 534
Current Sales of Gas Products 534
New Capital Issues 534
Contracts Advertised To-Day 534

Stock and Share List 533

"JOURNAL" Telephone: Central 2236-7 (2 lines).



Why hesitate

when efficient public lighting is assured with

Kempton's Lamps?

Efficiency with Economy. *Maintenance Simplified*

Exact replica of Lamps that are being fitted in some of the important Main Thoroughfares in London Boroughs.

An Invitation

Members of the Institution of Gas Engineers attending the Annual Meeting in London are cordially invited to inspect, by appointment, our excellent London lighting installations.

Prices on Application—Sample without obligation

C. H. KEMPTON & Co. LTD.

Stangate House,
235, Westminster Bridge Road, London, S.E. 1

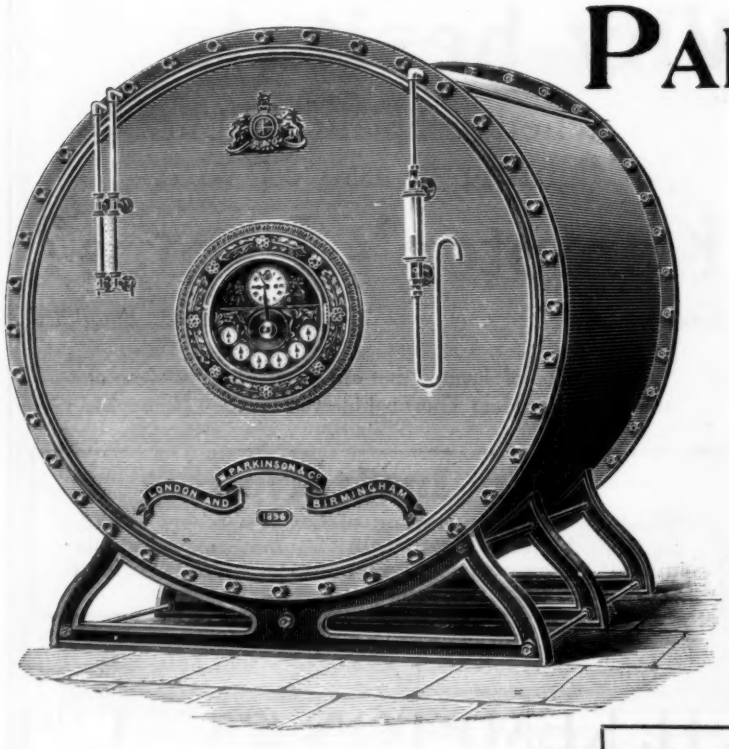
'Phones: Hop 3743, 5535. *Wires: Kemtomant, London.*

One of the qualities for which the Thomas Glover meter is noted is its durability. This is because every part of the meter is made with the utmost care of specially selected materials to withstand long and hard usage. It is all-British too — British design, British labour and British material.

THOMAS GLOVER & CO. LTD.

Original Dry Meter Makers : Established in 1844.

Gothic Works : EDMONTON : LONDON : N18 & Branches.



PARKINSON'S

CYLINDRICAL METERS.

Tracings, Specifications, and Prices, on application ——

W. PARKINSON & CO.,

INCORPORATED IN PARKINSON & COWAN (GAS METERS), LTD.

COTTAGE LANE, CITY ROAD, LONDON, E.C.1.	BELL BARN ROAD, BIRMINGHAM.	RAPHAEL STREET WORKS, CROMAC STREET, BELFAST.
Telegrams: "INDEX, 'PHONE, LONDON."	"GASMETERS, B'HAM."	"PREPAYMENT, BELFAST."
'Phone Nos.: 4270 Clerkenwell	2245 Midland, B'ham.	3374 Belfast.